THE MARINE REVIEW

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THE TURBINE AND GERMAN LINES.

The German lines are by no means convinced that the turbine is the best form of steamer for oversea purposes. Director Wiegand of the North German Lloyd says that the Lusitania's victory is not to be attributed to the fact that she has turbines but that she has such high horsepower—70,000.

The director continues: "The Lusitania's turbines, with their relatively small number of revolutions, should not run more economically, to say the least, than a good triple or quadruple-expansion steam engine. The economic value of the turbine lies chiefly in its high revolutions and the satisfactory utilization of steam thus secured. The rapid revolution of the propellers, however, means a reduction of their efficiency. In order to make the propellers revolve at the speed which renders them most effective, it is necessary to reduce the speed of the turbine to a point where it no longer operates economically. After many years' experience it has been found that the propellers of the North-German Lloyd's express steamers work most economically at about 80 revolutions per minute, whereas the Lusitania's screws have 180 revolutions. For this reason I do not believe that the Lusitania's machinery plant represents an advantage over the prevalent type. In other words, if I build a ship of the same dimensions and put into it an equal power in the form of reciprocating engines, the effective result will in all probability be the same, if not superior to the turbine-equipped steamer. One disadvantage of the turbine steamer is that it possesses inferior maneuvering capacity, because all the steam at hand cannot be used for backing.

"Another question arises: What practical advantage is it to increase the speed of steamers in the North Atlantic traffic to 24 or 25 knots per hour? I am of the opinion that the advantage is just about equal to zero. With our present speed of 22 to 23 knots we arrive at New York by day, whereas we should arrive at night if our steamers should make 24 or 25 knots. Precisely for this reason it was that we brought our express steamers up to 22 and 23 knots. It is well known that we refused to accept the Kaiser Friedrich several years ago because it did not make contract time and would land in New York at night. To bring us any practical advantage in this respect, therefore, the speed of a steamer must not stop with 24 or 25 knots, but would have to make 25½ to 26 knots. That is a circumstance which is not sufficiently taken account of in Germany. We are under obligations to call at Southampton and Cherbourg within certain hours in order to make connections with the trains for London and Paris, and must accordingly stop our steamers at the usual hours, and we could not equalize matters (in case very fast steamers were used) by postponing the sailings for several hours."

Director Wiegand concludes that if the Lloyd should increase the speed of its steamers to 24½ knots their operation would be less economical, since the vessels themselves would cost more, consume more coal, and besides all this would arrive in New York at night, after which they would be compelled to lie at their docks till the regular time for sailing, thus counterbalancing any advantage from greater speed. "Of course," he adds, "if we increase their speed to above 25 knots they would arrive at comfortable hours, but the cost of such a steamer of about $7,500,000, along with the vastly increased expense of operation, would be out of all proportion, economically, to the saving of time at sea. Such a saving would not present a strong enough attraction for the general public to make them willing to pay the increased price of tickets. Hence, as our company is dependent upon its own resources (instead of subsidies) it could not get any business advantage from putting on such fast steamers."

The report that the vibration on the Lusitania is considerably greater than on the fast German steamers has been looked upon here as an additional reason for the German lines to adhere to the old type of engine. Owing in part to that increased vibration the Germans think that this steamer and the Mauretania will not prove dangerous competitors for the first-class passenger traffic between Europe and New York. Only when they make much faster time than the Lusitania did on her maiden voyage could they become dangerous rivals; but then the vibration would increase still more annoyingly, so as to neutralize the attraction of quick time; for comfort is, after all, the chief thing desired by the ocean traveler, and a day more or less at sea cuts a very slight figure with everybody except a few hurried business men.

PROSPECTS OF THE RATE WAR.

The German companies do not look upon the Lusitania as the cause of the rate war that has broken out in the passenger traffic on the North Atlantic lines. It is said here that this fight would have come quite independently of the Cunard's new accession of fast steamers; and it has been expected for some time and in part even prepared for. The annual report of the Hamburg-Amerika line for 1906 referred to the probability that such a struggle might begin at any time, and it explained the large

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write-off shown in the annual balance-sheet as a provision made precisely for this eventuality. This was done, not because Director Ballin desired to make war upon English lines, but because he recognized the fact that the peace patched up three or four years ago was not a satisfactory arrangement and was likely to break down. He stoutly denied several weeks ago, when the first reductions in passenger rates were announced, that a rate war had begun; but the numerous cuts in the prices of tickets published since then have rendered it impossible longer to make it appear as if all were harmonious between the competing lines.

The earlier rate reductions were regarded with much seriousness by the financial community, and the shares of the two great Hamburg and Bremen lines were sold down pretty sharply in consequence. The more recent reductions, strangely enough, have been treated as far less serious from the speculative standpoint; and shares have refused to yield further ground. The stock operators evidently have come to the conclusion that the German lines are well equipped financially for the struggle that has begun, and that they will come out at the end without damage to their position. It is highly probable, too, that the people on the stock exchanges are speculating upon the calculation that the rate war will eventually lead to a more satisfactory agreement between the great international lines in regard to passenger rates, and one that will prove more or less permanent. It is known that this is the goal aimed at by Director Ballin, and Bourse traders believe that he will succeed in making it.

SHIP OWNERS' APPRENTICE SYSTEM.

The Shipowners' Association of the Pacific Coast is undertaking upon its own initiative a system of apprenticeship and has received the promise of support from a number of owners and the assurance from many young men that they will go out as apprentices under the agreement. The Shipowners' Association of the Pacific Coast, whose offices are in the Ferry post-office building, San Francisco, are projecting this form of apprenticeship partly for patriotic reasons to the end that an opening may be made to the youth of this country of obtaining a seafaring training tending to the betterment of the American merchant marine and a school for American officers. The officers of all the different departments aboard ship are strongly urged to recruit in the apprentice service their own boys as well as those of relatives and friends. The apprentice will rate at the end of the third year as a petty officer. He will be instructed in seamanship and navigation, to receive and deliver cargo, stow and secure cargo, running the winches and capstans, the making and taking in of sails, writing the log, heaving the lead, steering by compass, knotting and splicing, use of palm and needle, the opening and unbinding of sails, signals, use of boats, etc. The pay will be $20 per month for the first year, $30 per month for the second year and $40 per month for the third year, with a bonus of $250 for good service and behavior.

SHIP BUILDING IN THE UNITED KINGDOM.

From the returns compiled by *Lloyds Register of Shipment*, it appears that, excluding warships, there were 450 vessels of 1,080,087 tons gross under construction in the United Kingdom at the close of the quarter ended Sept. 30, 1907. The particulars of the vessels in question are as follows, similar details being given for the corresponding period in 1906 for the purpose of comparison:

	Sept. 30, 1907		Sept. 30, 1906.	
Description.	No.	Gross Tonnage	No.	Gross Tonnage.
Steam.				
Steel	417	1,068 271	477	1,253,031
Iron	..	.....	1	500
Wood and composite	2	151	..	.....
Total	419	1,068,422	478	1,253,531
Sail.				
Steel	17	10,484	20	9,836
Iron	..	.....	..	.....
Wood and composite	14	1,181	14	1,400
Total	31	11,665	34	11,236
Total steam and sail	450	1,080,087	512	1,264,767

The tonnage now under construction is 170,000 tons less than that which was in hand at the end of last quarter, and nearly 185,000 tons less than that building twelve months ago.

Of the vessels under construction in the United Kingdom at the end of September, 356 of 790,472 tons are under the supervision of the surveyors of *Lloyds Register* with a view to classification by this society. In addition, 59 vessels of 172,070 tons are building abroad with a view to classification. The total building at the present time under the supervison of *Lloyds Register* is, thus, 415 vessels of 962,542 tons.

SHOULD HELP OUR MERCHANT MARINE

The following communication to the *Brooklyn Eagle* is of interest:

I agree with Admiral Dewey that we should never give up the Philippine Islands. England, Germany or Japan want them. If these countries consider the islands good for them to own, I guess they are good for the United States to hold on to. We are spending $300,000,000 building the Panama Canal as a short cut to our Pacific coast states, and the Philippines will come in handy for naval and coaling stations, and will increase our export trade with the far east.

Mr. Seaver, in a letter to the *Eagle*, says there should be free trade between the islands and the United States. The islands do export hemp free of duty to the states and a reduced rate of duty on Manilla sugar. In time to come there will be further reductions. He should not expect the reduction to be so large as to injure the cane sugar industry of the southern states or the beet industry of our western states.

Protection is the settled policy of the United States. We had a revision of the tariff or a freer trade bill, known as the Wilson-Gorman bill. Under it the farmers of the west had corn to burn, and President Cleveland had to put the country in pawn to raise money to pay the current expenses of government. In 1897, we had another revision of the tariff to bring about freer trade between foreign countries and the United States, known as the Dingley bill. Under this bill the farmers of the west had money to burn and have been burning it ever since. Under this bill 95 per cent of the products of this country are consumed here and only 5 per cent are exported, yet that 5 per cent is greater than the exports of any other country, all carried for us in vessels built in free trade countries—England 75 per cent and Germany and Norway the balance.

This country does not protect the American ship builder, but confines protection to the farmer and the manufacturer In 1861 the American ship builder did not need protection, as 66 per cent of our foreign carrying trade was done in American built ships in those days. As the country prospered under protection wages increased, cost of material also, and the American ship builder had to confine himself to coastwise ship building. So today our American built ships engaged in foreign trade has fallen to 10 per cent.

A British cheap labor built vessel can be built 50 per cent cheaper and

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manned and maintained 50 per cent less than in this country. Protecting the farmer and manufacturer has ruined the ship builders, and today the country is paying $200,000,000 a year to foreign ship owners for carrying our goods. The farmer has had millions of dollars spent in irrigation of bad lands of the west and hundreds of thousands of dollars for free seeds. The American manufacturers own shares in foreign built ships for cheap freight rates.

As an act of simple justice a ship subsidy bill should become a law. Robert Fulton built the first steam vessel to ply the water. Stephenson, of England, built the first locomotive. We are protected against the cheap labor built locomotives of England, and today we supply a population of 85,000,000 and supply foreign countries with our surplus locomotives. Having no protection against cheap labor built foreign vessels, we have no merchant marine. In 1902 we built 408 automobiles; in 1906 we built 58,000; France, 55,000; England, 20,000; Germany, 15,000. We have the most skilled and best paid labor in the world. We are building the best navy in the world. When our sailors serve their time we want an American merchant marine to put them in. We have unlimited coal and iron and there should be no reason for the sixtieth congress refusing to restore our merchant marine.

Secretary of State Root made a trip to South America looking for new business for the products of the farmer and manufacturer, and the interests of American built ships to carry the goods. He was Uncle Sam's advance salesman. I hope he will be running the shop in Washington on March 4, 1909.

PROTECTIONIST.

Brooklyn, Oct. 7, 1907.

RUNNING OCEAN STEAMSHIPS BY WIRELESS.

Editor MARINE REVIEW:—It was recently stated by the Hon. Hugh Bell, the eminent authority on electricity, that a century hence, Niagara Falls will furnish the power to run ocean steamships by wireless current. What a consolation to know that some day there is a possibility of there being an American merchant marine service. This, of course, providing that the "favored nation clause" "a la German agreement," does not compel the United States of North America to furnish the German republic merchant marine with the current free of cost.

JOHN B. HARDY.

New York, Oct. 9.

THE STRUCTURAL DETAILS OF CARGO STEAMERS IN RELATION TO THEIR WATER BALLAST ARRANGEMENTS*

BY SAMUEL J. P. THEARLE.

Water-ballast was first carried in screw-colliers trading between the Tyne and the Thames. The old sailing colliers were ballasted with Thames gravel for the voyage northward, and this was put ashore on Tyneside before the coal cargo was loaded. The cost of loading and discharging this ballast was a heavy charge on the freights earned by the vessel.

The earliest steam-colliers were ballasted in a similar manner, but it at length occurred to an ingenious person that water was superior to gravel as a ballasting material, because it might be made to flow into and out of a vessel, instead of being carried in baskets. And so tanks were built in the bottom of the steamer, into which water was admitted for ballasting, and out of which it could be pumped when no longer required. Very soon these tanks became an integral part of the structure, and thence originated the McIntyre tank.

The structural details of the McIntyre tank are well known. They consist of longitudinal girders standing upon the floors of the steamer, supporting an inner bottom which is attached to the outer bottom of the vessel by a flanged margin-plate on each side. To these margin-plates the side framing of the vessel is attached by angles riveted to brackets on the frame-heels. In the earliest screw-colliers fitted with double bottoms the frames passed continuously through the margin-plate, and the latter was made water-tight by means of collars or some other device. The chief and characteristic structural feature of the McIntyre tank is, however, the bracket attachment of the frames to the flanged margin-plate.

It should here be noticed that the inner bottom plating, longitudinal girders and margin-plates, takes the place of the centre and side keelsons previously required in such vessels. The net result is an increase in the structural strength of the bottom of the vessel and an additional weight of materials used in her contruction. At the same time an element of safety is introduced in the form of an inner bottom, and a great saving is effected in the cost of ballasting the vessel and in the time occupied in getting the ballast into and out of her.

A proximate step consisted in the adoption of the cellular system of double-bottom construction. In this arrangement the normal floors were replaced by floors extending the full depth from outer to inner bottom, and the numerous longitudinal girders standing on the floors were replaced by a centre continuous girder and by one of or more side girders. The arrangement of margin-plate remained the same as in the McIntyre tank. Two systems of cellular double bottom are adopted, in one of which floors are spaced at every frame, and in the other at alternate frames, the side girders being much more closely spaced in the latter than in the former arrangement.

The Board of Trade ultimately sanctioned the omission of the whole of the double bottom space in measuring the vessel for tonnage, and this concession gave a great impetus to the system, which at the present day is adopted in all but the smallest of cargo-steamers. The depth of the double bottom at the middle line, although fixed by Registry Society Rules, seems to be actually governed rather by water-ballast carrying requirements than by the necessities of structural strength. The minimum breadth of margin-plate is, however, limited by the necessity for obtaining a sufficient rivet attachment of the brackets at the frame-heels to maintain a continuity of transverse strength.

It is submitted for the consideration of this meeting whether the structural strength of cellular double bottoms in cargo-holds is not usually somewhat in excess of actual requirements. Under boilers the wasting of steel plates and angles of the double bottom goes on at a very rapid rate, and an excess of scantlings at that part is therefore desirable in a new steamer in order to avoid the necessity of early renewals. But under cargo-holds the rate of wasting is not considerable, nor is it believed to be in excess of that experienced on the outer bottom and sides of a vessel.

Various measures have been suggested and tried for reducing the rate of wasting in double bottoms under boilers. Different paints, bituminous compositions, and lime and cement washes have their several advocates. Some have proposed means for minimizing the rate of corrosion by ventilation, and others have sought to obtain that result by keeping a low temperature in the space under the boilers. It is thought that a discussion on this important question might

*Paper read at the Engineering Conference of the Institution of Civil Engineers.

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properly come within the scope of the title of this paper.

For some years past cold flanging has been largely adopted in lieu of angle attachments in double bottoms of steamers. Floor-plates have been flanged at their upper and lower edges, and intercostal plates have been sometimes flanged against the floors and sometimes flanged on their upper and lower egdes. It is generally admitted that recourse to flanging involves the necessity for the best workmanship and the most closely-fitting surfaces. It is also generally recognized that flanging does not provide the same rigidity of connection as an angle-bar. But it is believed by many that the association of flanged materials, as in the structure of a cellular double bottom, does produce under proper conditions an efficient combination, and one that is suitable for resisting the stresses coming upon it, either afloat or on well-laid blocks in a dry dock. It is, however, not so generally conceded that flanged floors are so well able to resist the stresses resulting from grounding or stranding as floors riveted to frames and reverse frames. This is an important question, and attention to it is now invited.

Vessels fitted with cellular double bottoms usually have after-peak ballast-tanks for trimming purposes, and some have fore-peak ballast-tanks also. In each case, valuable use is thereby made of a space which can be employed for but a few other purposes. Certain precautions are, however, found necessary in view of the fact that these peaks are sometimes only partly filled with water. It need hardly be remarked that when at sea they should always be either quite full or quite empty. If quite full, the stresses due to the water-pressure within the tank are about balanced by those due to the water-pressure on the outside. If quite empty, the stresses upon the shell-plating and framing are no greater than those ordinarily experienced elsewhere on the immersed portion of the hull. But when the peaks are only partially full of water, the violent movements of the vessel in a seaway set up stresses of a destructive character. To minimize the results of these, deep washplates should be fitted, and these should be efficiently secured. It is further desirable that the rivets through the frames and shell-plating should be more closely spaced than elsewhere in the sides and bottom of the vessel. Even with such precautions, damaging stresses result from peak ballast-tanks being only partly full of water when at sea.

It has of late years been usual to fit midship deep tanks in cargo-steamers, in order to obtain the necessary immersion when the vessels are in ballast trim. Such deep ballast-tanks sometimes contain upwards of 1,000 tons of water. If they are kept full of water, the stresses upon the materials of which the tanks are built are such as may easily be provider for; but if only partly full when at sea, then, having regard to the much greater breadth of the vessel where the tanks are situated than at her extremities, the violent motion of the free water is even more damaging than in the peaks.

In order to reduce the longitudinal movement it has been usual to keep the length of an individual tank within moderate limits, and in cases where, say, 2,000 tons of water have to be carried in that way, to build two tanks rather than only one. Also, to moderate the effect of transverse movement, it has been usual to fit a longitudinal middle-line bulkhead in the tank, extending from the top to the bottom. It has also been usual to additionally strengthen the sides of the vessel by web frames in way of deep tanks. The rivets through frames and shell have been more closely spaced than elsewhere in the vessel, except the peaks; and, of course, the transverse bulkheads bounding the deep tanks have been very thoroughly stiffened.

Cargo is carried in these deep tanks when they are not used for water-ballasting purposes; and consequently there has always been a natural desire to break the stowage as little as possible inside the tank, and to make the work of getting the cargo in and out of it as simple as possible. In order to effect this, the middle-line longitudinal bulkhead has in some cases been omitted, and there is a growing desire to dispense with it altogether. Were all men trustworthy, so that it might be definitely ensured that a deep tank would always be completely filled with water when at sea, the omission of the longitudinal partition bulkhead would not be a matter of much moment, and the loss of stiffening to the transverse bulkheads resulting from the omission could be easily supplied in some other way. But in view of what experience shows to be a not unusual treatment of ballast-tanks at sea, it is submitted that the fiitting of the middle-line longitudinal bulkhead is so desirable as to override any objection to it arising from inconvenience or broken stowage.

When deep tanks are not fitted in a steamer, and when the weight of the water carried in the after-peak tank is not sufficient, acting in conjunction with the other water ballasting, to give the necessary immersion to the screw propeller, it has been usual to supplement water with shingle or gravel, ballast carried on deck and thrown overboard on entering the loading port. To save the expense of taking this shingle ballast, or of building a deep tank in the steamer, some owners have authorized the masters of their vessels to admit water into the after-hold, by taking off some manhole covers from the inner bottom, and then opening the sea-cock until a sufficient quantity of water is admitted for obtaining the desired immersion of the screw-propeller. It has not been usual for the water admitted to extend above the top of the shaft tunnel, which latter thereby serves a useful purpose in partially checking the movement of the water due to the rolling of the vessel. Even with that limitation, the movement of such a body of free water has caused damage by washing up ceiling and sparring, and reducing them to pulp; and it cannot be doubted that the structure of the vessel might also be damaged under such conditions. It may be conceded that at a time of peril, with a vessel near a lee-shore and the propeller insufficiently immersed to get her into a position of safety, it might be allowable to choose the less of two evils, and admit free water into an after-hold in order to obtain the desired deeper immersion But a course which might be resorted to in order to save life and property should not be adopted as a normal condition of navigation in ballast, when attended with such evil consequences as are found to occur in this instance.

Of late some very valuable arrangements, both from a structural as well as from a navigator's or a shipowner's point of view, have been introduced into cargo-steamers. One of these is the Dixon and Harroway system of wing tanks for carrying water-ballast, and another is known as McGlashan's side-tank system. The figures on the walls show the two arrangements, which it is thought are well worthy of consideration. A primary object in both systems is to carry water-ballast at a higher level in the vessel than is possible in the ordinary double bottom, and so reduce the stability, which is often excessive in the modern-broad and shallow steamer when in ballast trim. Other important objects are also served. In both cases the tonnage meaurement is reduced by the arrangement from what it otherwise would be; and as such vessels are intended for carrying dead-weight cargoes, the available hold-space is amply sufficient for their owner's purposes. Dixon and Harroway's arrangement serves also the purpose of self-trimming, and both it and McGlashan's system add materially to the structural strength of the vessel.

As regards the Dixon and Harroway arrangement, it will be evident that with a reasonable spacing of transverse bulkheads, giving holds of not immoderate length, the fore-and-aft girders formed by the wing tanks and continuous hatch-coamings enable pillar suports to be dispensed with. This is a valuable feature in a cargo-steamer.

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The element of safety in case of collision, resulting from the inner skin-plating of the McGlashan side ballast-tanks, and from the wing compartments of the Harroway and Dixon arrangement, will also be evident.

Plans have been prepared for carrying water-ballast in enclosed spaces upon the upper decks of steamers between the hatchways. Other proposals have been made for carrying water in the 'tween decks, confined within compartments bulkheaded off for the purpose, and made available for cargo-carrying by having hatches fitted to them. Neitner of these arrangements has, however, found favour among shipowners. It will be evident that each would involve very considerable pillaring supports being placed beneath them.

It is submitted that a water-ballast-carrying arrangement in a steamer should serve the purpose of contributing both to her structural strength and to her safety at sea. The spaces devoted to water-ballast should also be of such a character that they would not be included in the tonnage measurment of the vessel, except when used for carrying cargo. They should be readily and freely accessible for examination, cleaning, and re-coating, and should be so proportioned and situated that the water within them will not detract seriously from the vessel's stability while the spaces are in course of being filled or emptied, nor unduly add to the vessel's stability when full. They should further be so constructed and fitted as to minimize the stresses set up within them, in the possible event of their being not quite filled when the vessel is rolling or pitching in a seaway; and they should be so situated in the vessel as not to set up undue stresses upon the structure when she is in a ballasted condition.

It is further submitted that if all these requirements could be satisfied without the hull of the vessel being any heavier than would have been the case had no water-ballast accommodation been provided, then, in such circumstances, an ideal arrangement would have been arrived at.

OVERHAULING WHEEL CHAINS.

Editor MARINE REVIEW:—Month to month we cannot but be struck with the percentage of numbers of mishaps to our lake fleet of vessels, owing to rudder gear out of order, or, worse still, chains parting or getting jammed; all sailors know what that means, in dirty weather, at night, or even in daylight. When I was an executive officer, lake water or ocean, I never failed to see my steering gear frequently overhauled, and at least several times a day the nips, or those parts that are continually working round the leads, greased; this should be the wheelsman's duty. Then again, masters of vessels should not be content to rely on others when taking charge, either at the beginning of the season, or during the season, but at least once a month after vessel has started season trip, to have chains and leads and pins of leads thoroughly overhauled and looked at; attention to this matter should be enforced, and we must always remember, even if matters are found all right, it is a satisfaction to know they are, and if a mishap should happen, which will in the best regulated ships, if the master can say he had attended to such matters, and others, it would help him.

I would also suggest that owners or managers should have such matters reported to them, and a record kept. We must not say we know all this and condemn the idea, for even this reminder may help some and it enforces the importance of such in their minds.

Remember in some vessels, a craft when at anchor, or laying at a wharf, friction is going on all the time as long as the vessel is afloat in clear water, rough or smooth.

Remember such matters as the above has cost the loss of life, loss of your vessel, and a large amount of dollars.

CAPT. GEO. F. COLES.

Collingwood, Ont., Oct. 15.

MISCELLANEOUS ITEMS.

The fifteenth annual meeting of the Society of Naval Architects and Marine Engineers will be held in the Engineering Societies Building, Thursday and Friday, Nov. 21 and 22. An excellent program of about fifteen papers is expected.

A. Drewell & Co., Kobe, Japan, have sold the Canadian Pacific Railroad Company's steamers Athenian and Tartar to a Japanese client. The Athenian was delivered on Sept. 14 and the Tartar is to be delivered on her next arrival from Vancouver in November.

Mr. Charles M. Schwab, owner of the plant of the Union Iron Works through the Bethlehem Steel Co., has at the suggestion of President Roosevelt gone to San Franscisco to personally put the plant in shape for taking care of the Pacific squadron when it reaches him. The squadron will doubtless be in need of extensive repairs after its long voyage.

The new boat built at Belfast for the White Star liner Suevic, was launched Oct. 5. The Suevic, as will be remembered, was wrecked off the Lizard early in the year, and the salvers were unable to save the forward part of the ship, although the after half of the vessel was practically uninjured. This part of the vessel is now in dry dock at Southampton awaiting the arrival of the new bow from Belfast, which, by the way, is considerably longer than the old one, and when the two pieces of the ship are put together the vessel will not only be as good as new but will have the added advantage of increased capacity.

The navy department is reported to be considering the question of offering free transportation to eastern workmen and their families, in order to induce them to go to the Pacific coast to effect the repairs which will be necessary to the battleship fleet while in those waters. The arrangement would be contingent upon an agreement by the workmen to remain in the service of the government for a certain time after arriving on the coast. Of course it will be necessary to agree to a higher scale of wages than is prevalent on the Atlantic seaboard, to conform to the standard of the Pacific coast.

As the outgrowth of the breaks in the Erie canal at Syracuse recently and the consequent delay in the repairs which was the cause of immense losses by the shipping interests using the canal, it is authoritatively stated that the canal boatmen and the shippers and receivers of freight are to demand the removal from office of Frederick C. Stevens, superintendent of public works of the state of New York, and who is responsible for the care and maintenance of the Erie canal as well as for the construction of the 1,000-ton barge canal. That it took two months to repair the first break and that immediately upon the completion of the repairs there was a second one in the same locality, is argued as showing incompetency, inasmuch as there had never previously been a break which put the canal out of commission for more than 13 days.

In spite of the fact that the opinion prevailing in the public mind is that the square-rigged merchantman has become nearly extinct, the port of Boston hastens to assert that there are many of this class of picturesque vessels trading to and from there, the majority of the vessels being British, Norwegian and Italian. Although the tramp steamer has cut into the monopoly of the lumber carrying trade between Canada and Europe, former-

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ly enjoyed by the Norwegian square rigger, hundreds of their barks are seen there every summer, and they have also bought steamers with which to compete with their rivals. The Russians, Swedes and Danes, as well as the Portuguese, have large fleets of full rigged ships and barks, which are occasionally represented by a caller at an American port. At one time Bath and other Maine ports and St. Johns, N. B., had large fleets of full rigged ships, but nearly all have disappeared, having been sold to foreigners or converted into barges, scows, etc. The Bath ships included some of the largest in the world and are recalled with pleasure by the older generation of the sailing fraternity.

SUMMARY OF NAVAL CONSTRUCTION.

The monthly summary of naval construction, issued by the bureau of construction and repair, shows the following progress upon vessels:

Name of Vessel.	Building at—	—1907— Per cent of completion. Sept. 1.	Oct. 1.
BATTLESHIPS.			
Mississippi	Wm. Cramp & Sons	91.97	94.96
Idaho	Wm. Cramp & Sons	86.01	87.54
New Hampshire	New York S. B. Co.	83.00	85.30
South Carolina	Wm. Cramp & Sons	21.70	24.66
Michigan	New York S. B. Co.	24.00	25.70
Delaware	Newport News S. B. Co.	00.00	00.65
North Dakota	Fore River S. B. Co.	00.00	00.00
ARMORED CRUISERS.			
*South Dakota	Union Iron Works	98.90	99.90
North Carolina	Newport News S. B. Co.	88.99	91.50
Montana	Newport News S. B. Co.	82.58	84.62
SCOUT CRUISERS.			
Chester	Bath Iron Works	88.72	90.64
Birmingham	Fore River S. B. Co.	87.75	89.46
Salem	Fore River S. B. Co.	86.57	86.99
SUBMARINE TORPEDO BOATS.			
Submarine T. B. No. 9	Fore River S. B. Co.	99.00	99.00
Submarine T. B. No. 10	Fore River S. B. Co.	99.00	99.00
Submarine T. B. No. 11	Fore River S. B. Co.	99.00	99.00
Submarine T. B. No. 12	Fore River S. B. Co.	99.00	99.00
COLLIERS.			
Vestal	Navy Yard, New York	43.00	49.00
Prometheus	Navy Yard, Mare Island	00.70	00.70
TUG BOATS.			
Patapsco	Navy Yard, Portsmouth	21.00	28.00
Patuxent	Navy Yard, Norfolk	18.00	25.00

*South Dakota delivered at the Navy Yard, Mare Island, Oct. 2, 1907.

CYPRUS REFLECTIONS.

Buffalo, Oct. 22.—The talk of marine men is, of course, about the loss of the new Lackawanna steamer Cyprus on Lake Superior, some of it of the casual sort that does not repay repetition and some that is in the line of sharp warning from experts that well deserves heeding.

"When I first read the short report of the loss of the Cyprus," said an old and tried steamboat inspector, "I knew well enough without any details that she was swamped through her hatches, and I want to say right here that if present practices are kept up there will be more of the same sort of losses. It can't be helped, so long as the practice of not trimming the ore cargoes and leaving the hatches unbattened continues. Most of such cargoes will go through safely, but once in a while a steamer will get caught just as the Cyprus was, and then a pretty sure repetition of the Cyprus case follows:

"I am aware that the practice is not to trim the ore cargoes, but I have done my best to stop it. If the insurance people would refuse to insure such cargoes that would correct the abuse, but there are so many companies ready to cover almost anything that it is hard to stop the careless practice. Of course it costs money to trim the ore and where there are anywhere up to 34 hatches in a vessel it is a matter of hours to put the tarpaulins on them. I have left them off myself and so do not speak as a mere critic of other people. I am telling the vessel owners what will happen if they let their vessels go out in this careless way."

There was at first some effort to discover some sort of parallel between the loss of the Cyprus and the Western Reserve, which was one of the first of the modern steel steamers to go down, but the resemblance was found to be entirely from the fact that the two accidents were in the same locality and in each case the second mate only of all the crew was saved. There is much sorrow expressed over the loss of Captain Huyck. He was one of the rather numerous good lake captains who came from the little town of Sheridan in Chautauqua county, N. Y., and is said to have been the only one of them all so far to lose his life in any such way.

But the Western Reserve does not parallel the Cyprus nearly so closely as the steamer W. H. Gilcher, which was also lost that fall, may have done, for the Western Reserve was light, while the Gilcher was loaded, but as there was no survivor in that case all is conjecture. The Bannockburn case is also cited, but she was lost in calm weather.

Some very odd coincidences always occur in connection with such cases. A visitor to one of the marine insurance offices the other day took occasion to ask how the season's earnings looked and was told that it needed one total loss to wipe them all out. At that very moment the storm that ended the Cyprus was brewing on Lake Superior. Still it is reported that the Cyprus was not insured on the lakes, so that London is likely to be called on to pay for her direct. A second call on an underwriter found him figuring up the insurance on the old steamer John W. Moore, which he found to be $94,000 and which he may have to pay, though it is said that the Queen City, the other vessel in the collision, may be taxed for it, or possibly the Moore may be raised.

The loss of the Cyprus has stirred up certain Buffalo vessel owners, so that they will look more closely to their craft, and its management for a while at least. One of them said the other day that his 500-footer, not long in commission, did no sailing with open or unbattened hatches. Even when moving about in Buffalo harbor the captain always had them fastened down securely. It is a good habit to form, even if the crew does grumble over what is mostly unnecessary work. Some day the rule may work out and we have the best of authority for saying that the Cyprus will prove not to be the last to go from the combination of shifted cargoes and unbattened hatches.

So the loss of the Cyprus is not to be carried to the ship yards for correction. "She was built all right," says an authority. There was always much casting about for a structural reason for the loss of the Gilcher and the Western Reserve and it was to a certain extent made to appear that had the latter been loaded she would not have sheared off any rivets and

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would have danced about so much less that she would no doubt have weathered the storm. There will of course be no light thrown on the loss of the Gilcher and the Bannockburn.

On the whole the new steel steamer has made a much better history as a sea boat than was feared when the Western Reserve and Gilcher were lost. There is not much uneasiness in ship yards or anywhere else from that direction and if the owner will insist on having his steamer draw a foot or two more water than is safe at all times and the insurance is willing to pay for the new bottoms, the ship yards will very cheerfully do the work at so much per day.

JOHN W. CHAMBERLIN.

LAUNCH OF THE NAVAHOE.

On Thursday, Oct. 10, Messrs. Harland & Wolff successfully launched the ocean-going barge Navahoe, built to the order of the Anglo-American Oil Co. This vessel is 450 ft. long by 58 ft. beam, and about 8,000 tons register, and has been specially designed and constructed for the transport of over 10,000 tons of oil in bulk. The vessel will have an exceptionally complete oil pumping system for loading and discharging, also steam steering gear, deck machinery, etc., all the arrangements being of the latest type. There will also be a single ended boiler (arranged for burning oil fuel) to generate the power for driving the pumps, etc. A very complete installation of electric light is fitted.

The vessel is fitted with six masts, with fore and aft sails and gear complete, also a special towing machine and large patent towing chock for connecting her with one of the company's steamers, by which the barge will be towed across the ocean, the Navahoe being the counterpart of the Iroquois now finishing for the same company, the combination of the two vessels enabling one steamer to bring from port to port 20,000 tons of oil at one time.

The owners were represented by Mr. Maclean, general manager, Mr. Ford, of New York, naval architect, and Mr. Hallenbach, assistant manager of the shipping department, New York.

The battleship Alabama has been berthed at the Brooklyn Navy Yard for repairs. The port engine was disabled at sea through a fracture in one of the cylinders, and it is expected that the repairs will keep the Alabama at the yard for about three weeks.

MARINE INTERESTS ASSOCIATION.

The Marine Interests Association, Marquette building, Chicago, Ill., has been formed for the purpose of endeavoring to establish such relations with the secretary of commerce and labor and the board of supervising inspectors as will bring about the enactment of reasonable rules and regulations governing steamboats and the repeal of any that have become impracticable. The association has mapped out wide work for itself, embracing not only the work undertaken by the National Board of Steam Navigation but also that undertaken by motor boat manufacturers. There is a settled conviction that the rules and regulations governing steam and motor driven craft should have greater flexibility. The association will probably have a delegation at the next annual meeting of the board of supervising inspectors at Washington.

SUBMARINE SIGNALS.

The Submarine Signal Co., Boston, Mass., announces that the United States has arranged for 50 submarine signal stations, Canada nine, England seven, Germany six, Holland five, and Denmark one. These equipments include the Atlantic, Pacific and Gulf coasts of the United States and great lakes, the river St. Lawrence, and the coasts of the United States, the English channel and connecting waters—in short, the regions where fog is the most serious menace to navigation. Fifty-seven steamship lines and five navies have installed on their vessels the apparatus to receive submarine signals.

A REMARKABLE MAN.

The centennial anniversary on Aug. 17 of Fulton's steamboat recalls the genius of this remarkable man in other ways. He planned and built a submarine for use in war and constructed and demonstrated a submarine torpedo in England on October 15, 1805. With 180 lb. of powder and some clockwork which was timed to explode in 18 minutes he blew to fragments the Dorothea, a 200-ton brig which had confidently been lent by Pitt for the experiment. The torpedo had to be towed under water by men in two small boats and drawn under the vessel by ropes, a maneuver contemplated only in the dark during hostilities. It is difficult to place bounds to what Fulton might have done could he have had the benefit of the scientific and mechanical facilities of today.

LAUNCHING A BATTLESHIP.

It costs about $15,000 simply to launch an English battleship, some of the items being: Grandstand for invited guests, $1,000; hire of eight tugs to hold the ship after launching, $1,000; four huge wood and steel cradles, $10,000; tallow, oil and soap to grease the ways, $500; souvenir invitations, $500; present for the lady who launches the vessel, $500, and the banquet which follows uses up the balance. The launching is accomplished by cutting a cord which releases four iron weights, and these, falling quite a distance, knock out the "dog shores" which hold the cradles. The critical instant is when the vessel is almost water-borne with the fore end still on land. The friction from the weight is so great that the false keel is sometimes fused, even under water. Eight chains, weighing about 600 tons, hang from the sides of the ship and drag along the ground to retard the ship.

TIME ON SHIP BOARD.

Time on shipboard is calculated by what appears, at first, to be a complicated method. The twenty-four hours are divided into "watches" of four hours each. One watch begins, for instance, at 12 o'clock. At half past 12 the ship's bell is struck once; at 1 o'clock, twice—two bells it is called—and so on, an additional "bell" being struck every half-hour until 4 o'clock is marked by "eight bells." The watch is then changed, and at half-past 4 "bell" time begins all over again, the bell being struck once again. The period from 4 in the afternoon until 8 is divided into the first and second "dog-watches," each lasting two instead of four hours. The two dog-watches makes seven watches in all, and this enables the crew to keep them alternately, as the watch which comes on duty at noon one day has the afternoon next day, and the men who have only four hours' rest one night have eight hours the next night. This is the reason for having the dog-watches, which are made by dividing the hours from 4 p. m. to 8 p. m. into two watches. "Eight bells" is either 12 o'clock noon or midnight, and 4 o'clock a. m. or p. m. One bell is half-past 12, half-past 4 or half-past 8 o'clock. Two bells may be either 1 a. m. or 1 p. m.; 5 a. m. or 5 p. m. and 9 a. m. or 9 p. m., etc. Here on the lakes the watches are of 6 hours' duration, 6 on and 6 off. Bell time is kept just the same as in the above case, however.

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THE MARINE REVIEW

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October 24, 1907.

AMERICAN SHIPPING.

It is understood that an appeal may be made against the recent decision of Attorney General Bonaparte in the matter of transportation of coal to American ports on the Pacific coast in foreign bottoms. Authorities are by no means agreed that his decision is a sound one. On the contrary it establishes a rather dangerous precedent. The American coastwise trade belongs to American ships and it is not easy to understand why any department of the government should set aside a law that no citizen would be permitted to ignore. The transfer of coal to the Pacific afforded the navy department an excellent opportunity to aid the American merchant marine, but the opportunity instead of being seized upon was transformed into a positive injury. The business of shipping has practically slipped from American hands. It is a sad commentary to make upon it, that our foreign tonnage is no greater now than it was a hundred years ago; but it cannot progress under existing conditions and must inevitably cease to exist. All economists to the contrary notwithstanding this is an appalling state of affairs, and one which a country that has a coast line greater than that of any other nation except Russia should not suffer to exist. The economist will say that as long as any one else will transport goods more cheaply than the United States can transport them, that it is good business to permit it to be done; but this is practically begging the question. This nation should be self-contained; it should have its own ships. The United States would have its own ships were it not for its fiscal policy which has protected everything except shipping. The protective tariff has so advanced the general wage scale of the United States that the labor cost of a ship is fully 40 per cent greater in this country than abroad. It has therefore to earn dividends upon a capital cost 40 per cent greater than its rival. Obviously freight rates being equal, it cannot earn them. There is no hope for the revival of the American merchant marine in the foreign trade except through direct governmental aid which will overcome this handicap. The handicap is a purely artificial one and should be met by artificial means.

THE LAKE SURVEY.

"As near perfection as perfection is possible" is the editorial description of the lake survey charts in the MARINE REVIEW of Oct. 10. This commendation is exceedingly pleasing to the officers charged with their preparation and issuance.

The commendation is however qualified, and actually reads "would be as near perfection as perfection is possible," if the latitude and longitude marginal scales were in minute divisions instead of five-minute divisions.

It is believed that the lake survey charts are the best navigators' charts in the world, but that is no reason why they should not be better, and every year does make them better. To find out what masters want, and then give it to them, is the policy of the office.

It is doubtful if a clear conception exists in the minds even of those intimately connected with the commerce of the lakes of the magnitude of the work intrusted to the lake survey.

The great lakes, as the right-of-way of a vast transportation system, in which upwards of $125,000,000 are invested in the vessels, and $50,000,000 a year are paid in freight charges, has to have its civil engineers just the same as the Pennsylvania railroad or the New York Central does. In the organization of this engineering force the lakes are divided into seven engineer districts, having offices at Buffalo, Cleveland, Detroit, Grand Rapids, Chicago, Milwaukee and Duluth. The district engineers are of the corps of engineers under the secretary of war. The magnificent ship locks, harbor constructions, and artificial channels of the lake system are evidences of the wisdom of entrusting the public works of the country to the corps.

The seven district engineers are occupied most largely with the artificial channels and terminals of the lakes—the rivers and harbors.

The lake survey, under Maj. Charles Keller of the corps, corresponds to an eighth district, and is charged with safe-guarding navigation in those portions of the lakes outside the rivers and harbors.

Is there a region of Lake Erie where unknown shoals are still uncharted? The lake survey sweeps it, shows up the dangers, and charts them. Have ice, or storms, or other geological forces shifted old shoals or created new ones? The lake survey examines them. Are the wrecks of years ago menaces to the deeper draught of today? The lake survey relocates, and sounds them.

To do this work a fleet of five steamers has been created, a force of expert engineers has been organized,

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and the most modern methods of submarine searches have been put into operation.

All the information gathered by this fleet, and by the seven district engineers, and received from all other reliable sources, is incorporated on the charts, is issued in bulletins, and where it seems urgent to get it quickly into the hands of masters, is mailed in special notices to mariners, and given to the press all over the great lakes.

In addition to soundings, sweepings and magnetic work, the lake survey is making extensive examinations with a view of reservoiring the lakes, or some of them, as Lakes Erie and Michigan and Huron, to prevent low water, and to offset such encroachments on the lake water as are made by the Chicago drainage canal.

All these things are vitally important to navigation on the lakes, and to the safe carriage of deep draught cargoes.

The government, viewing the right-of-way of the lakes as a case of the public ownership of a great transportation system, is bound to protect the carriers to the utmost and cheapen rates, by better lake levels and greater security against unknown submarine obstacles.

This is all very plain to those who know the lakes as masters or ship owners, but the last congress cut the appropriation necessary to carry on the engineering operations of the lake survey, so that only three out of the five steamers of the survey are now in commission, the engineering force is reduced by more than half, and the engravers are working on half time.

The lake survey with little money in its pocket is doing its best to give the navigation interests of the lakes what they want, and has faith that if the work it does on the lakes is needed, the reasonableness of financing it will be made apparent to congress.

Meanwhile with 117 different charts to keep up to date, the patience of those interested in the matter of latitude and longitude scales is invoked.

Keeping the charts up to date is in itself a large undertaking, and because so many things are constantly coming up discoveries of new shoals and wrecks, the opening of the West Neebish, frequent changes in lights, new channels in the Detroit river—a last year's chart is like a last year's newspaper and should be torn up by progressive masters, and replaced by a fresh revised chart.

NEW EXCURSION STEAMER.

The new excursion steamer for which contract was given to the American Ship Building Co. two weeks ago by the Lake Erie Excursion Co., will be built at the Buffalo ship yard and will be ready to go into commission at the opening of the excursion season next spring. When the contract was let the name of the proposed owners of the vessel was given as the Crystal Beach Navigation Co., but this company has since been reorganized under the name of the Lake Erie Excursion Co., and is composed of well-known Buffalo and Cleveland vessel men. The new steamer will run between Buffalo and Crystal Beach.

In appearance the steamer will resemble the Columbia plying in the Detroit river excursion trade. She will be built entirely of steel and will cost about $225,000. Her dimensions are to be 215 ft. over all, 45 ft. beam and 46 ft. beam over guards. Her bulkheads, water-tight compartments and water bottom will aid to make her almost, if not entirely non-sinkable. The machinery equipment will be of the most modern and up-to-date type, consisting of triple-expansion engines, with single screw, two boilers 12 ft. diameter by 12 ft. 6 in. long, fitted with Ellis & Eaves draft.

She will have accommodations for 3,500 passengers. Every known comfort has been provided for passengers. There will be a library-retiring room for ladies and smoking-room for gentlemen, both of the most substantial and luxurious character. A particularly attractive feature will be a grandstand which is to be erected on the mezzanine deck in such a way as to permit all passengers to hear the music which will be rendered regularly by an orchestra. The electric illumination on the steamer will be a great attraction. She will have four spacious decks which will provide dancing room for the passengers while enroute. Her seating plan will be given special care and attention. Broad gangways, stairways and spacious cabins will be another improvement over the prevailing type of excursion boats. It is estimated that 3,500 passengers can be discharged from this boat to the dock in ten minutes.

MOORE ABANDONED TO THE UNDERWRITERS.

The steel steamer John W. Moore which was in collision with the steamer Queen City in the Detroit river on Oct. 6, and sunk, has been abandoned to the underwriters, Worthington & Sill of Buffalo. The steamer is probably a total loss. The Moore was owned by F. M. Osborne of Cleveland and was built by the Craig Ship Building Co. at Toledo in 1890. The Moore was 246 ft. keel, and 40 ft. beam. She lies in thirty-three feet of water, and it is reported by divers that her keel from the stem is pushed back under the pilot house. The Queen City was also damaged considerably, and she will be out of commission about two weeks. Her whole port bow will have to be taken off, her two hawser pipes are broken and the bulwarks in the forecastle deck is laid flat. She is being repaired at Cleveland.

FREIGHT SITUATION.

The distinguishing characteristic in the freight situation at present is the shortage of coal at Lake Erie ports, due to lack of cars. The shortage has been so acute that vessels have been unable to obtain fuel and have been compelled to fuel in the rivers. The movement of coal, however, throughout the season has been quite heavy and the present shortage is not expected to affect the supply in the northwest, which is believed to be ample.

The grain trade is also feeling the effect of the car shortage and the work of unloading at Buffalo is slow. The grain tonnage, however, is in good demand at 2½ cents on wheat from Duluth, but owners are rather slow to charter as long as dispatch is so slow and believing also that the rate will presently advance.

IRON SITUATION.

Though there are increasing indications that iron and steel manufacturers are preparing for less active conditions of business, there is nothing in the general situation to justify the disordered state of affairs which has ruled in some of the large business centers within the past week. New business in iron and steel lines, with the possible exception of wire products, is light. The prices of light rails have been reduced from $2 to $3 a ton, according to sections, on account of shortage of orders and sharp competition. A weakness has developed in southern iron, No. 2 foundry, which had been held at $18 for this year's delivery, having been sold as low as $17.25. A fair tonnage of structural business is being done.

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GREAT LAKES REGISTER, NEW TABLES

When for the first time the marine architect or builders of ocean-going vessels, steps foot on board the completed modern lake-built bulk freight steamer, that now dominates the freight traffic of the great lakes, they will marvel at the genius and inspiration of the lake ship builder.

The proportions of these vessels exceed the limit of all previous rules laid down for ship building, unless it be for rivers and canal craft.

The rules given in *Lloyd's Register of Shipping* and also in *Bureau Veritas International Register of Shipping* for the proper proportions of an ocean-going vessel of one or two decks, are that the length between the stem and sternpost should not exceed eleven times the vessel's depth measured from the top of keel to the tc the top of the spar or weather deck beams, and that the length thus given should not exceed seven times the greatest beam of the vessel—and when it is found desirable to deviate from those proportions, compensation in way of additional strength to the various members of the vessel are given in tables prepared for that purpose, and when the proportions exceed 16 depths to the length, plans of the proposed vessel must be submitted to the proper members of the societies for consideration.

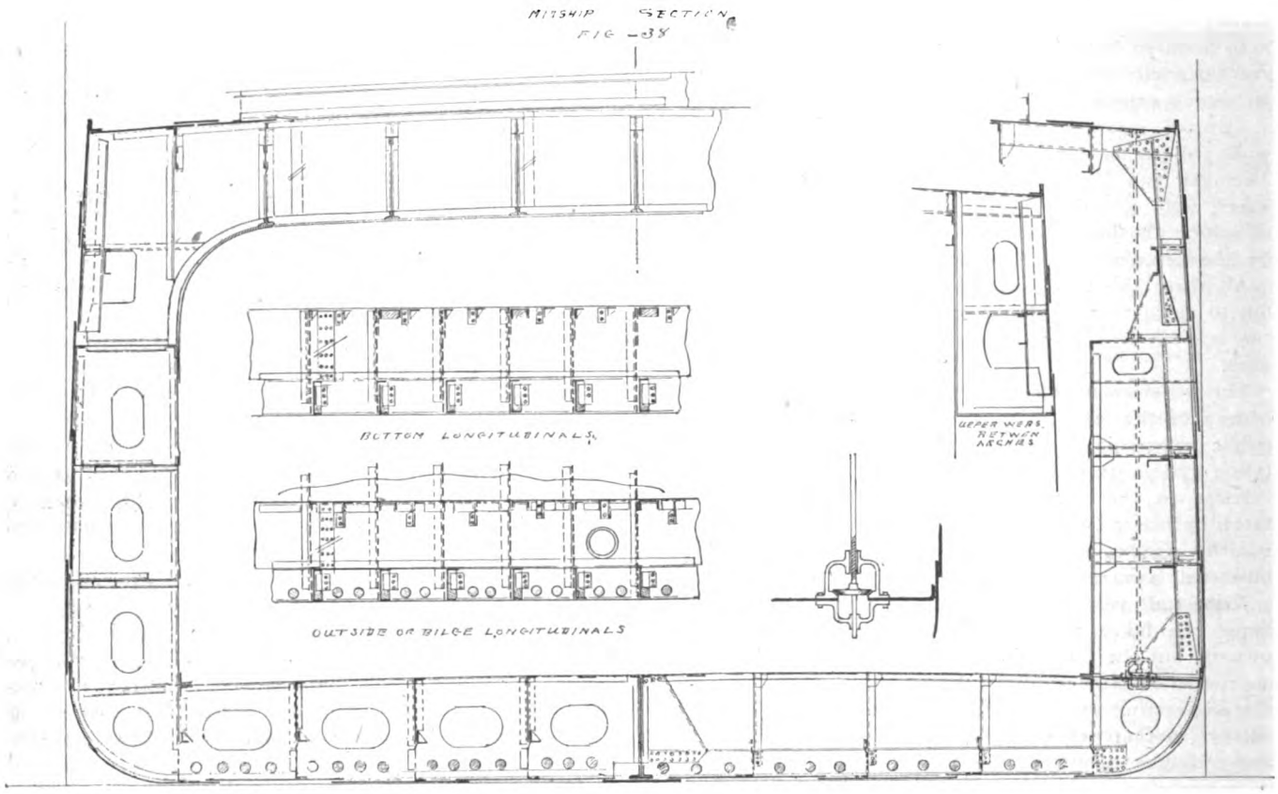
We would call the attention of the reader to these well-known les, that the true conception of the treme proportions of our modern lake built bulk freighter may be arrived at.

In our vessels of 600 feet in length and 32 feet depth of hold, we have a proportion of nearly 19 depths to her length, and by interpolation a vessel of 700 feet in length would give the unprecedented proportions of 20 depths to the vessel's length.

In comparing the proportions of the ocean and lake vessels the impression is that so much difference should not exist, that the extreme in the lake built vessels is beyond the limit. We should consider that while the ocean-going vessel has to contend with the winter storms of the north and south Atlantic, and with seas estimated to reach a height of 33 to 35 feet from the ocean level, the worst storms on Lake Superior fail to build a sea that will exceed seven feet in height from the lake level. This being the case we find the proportions for safety and fitness to be in favor of the lake-built vessels.

And in addition to the above mentioned extreme proportions, the modern lake-built bulk freighter include marked and novel changes from the type of the lake-built freighter of ten years ago.

By a system of deep plate and angle, spar deck arch girders all beams and stanchions within the cargo space are dispensed with, and all laid decks above the double bottom within the cargo space are also dispensed with.



These radical changes together with the introduction of side trimming tanks fitted between the double bottom and the main deck stringer on either side, and extending the full length of the cargo hatch, are inventions of the lake ship builders and architects, deserving of all praise.

For not only do they meet the demand for the rapid handling of bulk cargoes made imperative by the ever increasing volume of freight product flowing to the various lake centers, but it has been demonstrated beyond a doubt that this new type of vessel can be so built as to demand the fullest confidence in their ability to combat with ease and safety the seas and storms of the great lakes.

The dissimilarity in the construction of this novel type when compared with the steel freighter of five years ago is not generally understood by

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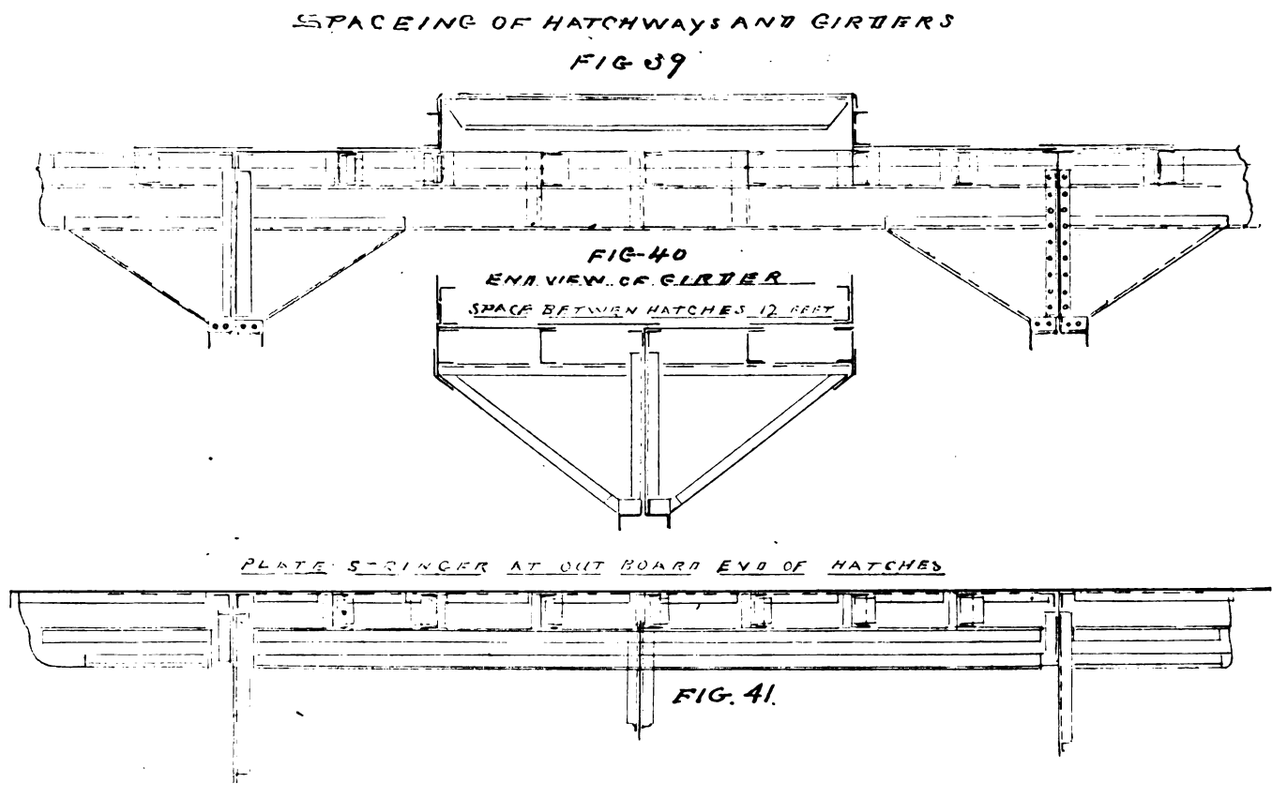


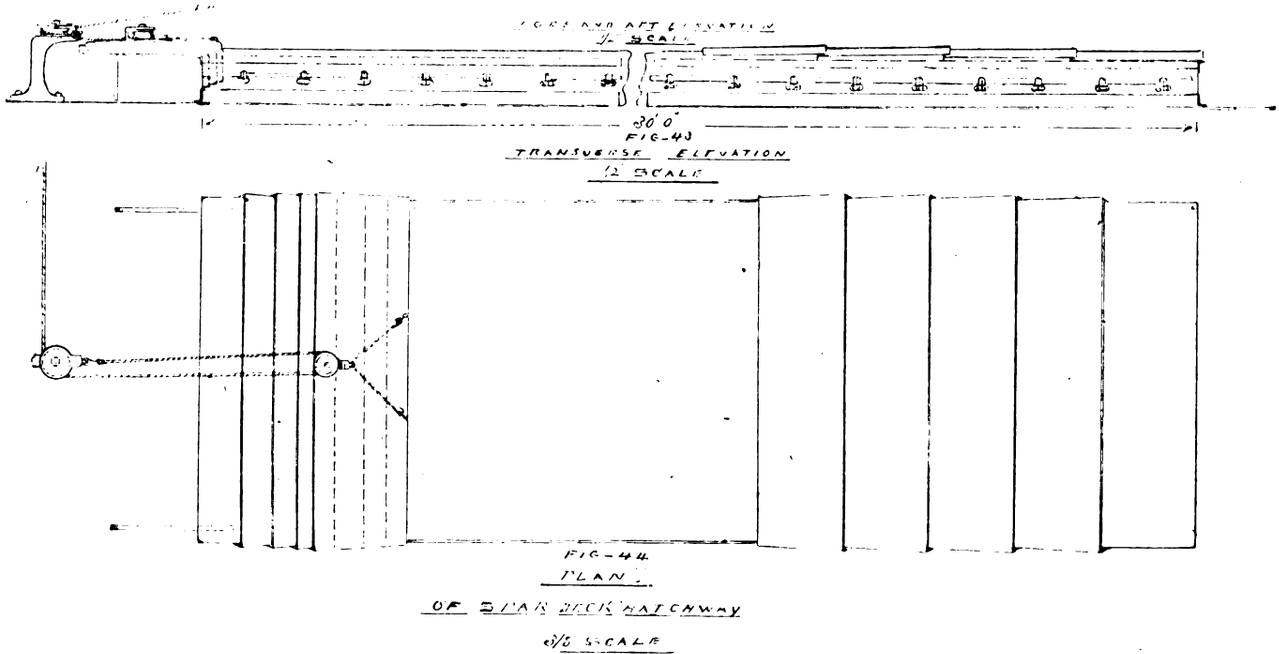
our lake people, and of course a mystery to the outside world.

This being true the management of *Great Lakes Register* believing it to be their province and duty, have with care and painstaking, endeavored to describe the method of construction in the new rules and tables which they have completed, and are now ready for publication.

And in submitting the work, we invite the friendly criticism of the lake ship builders, and ship owners; and especially do we invite the criticism of the lake ship builder with whom our committee and surveyors are in daily communication. We shall be glad to discuss and remedy such points as may prove to be in error.

In view of the fact that this particular type of vessel is unknown in any other part of the world, tables of a like construction, it is fair to suppose, do not exist. Therefore, our best and only field of research for the desired material were the lake ship yards and the office of *Great Lakes Register*, where detail drawings, specifications and reports of the general condition of these vessels, since these have been in commission, are to be found.

With the data thus obtained and a score or more of vessels of the type in question, that have been in commission from one to four seasons, as our blazing marks, we have gathered



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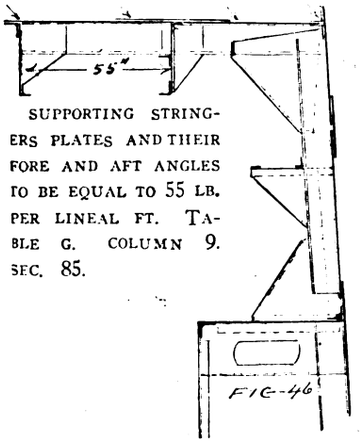
material for our new table.

And in choosing the material we have dissected and applied the scantlings of such vessels among the chosen list, that have withstood the demanded that their condition should be looked into.

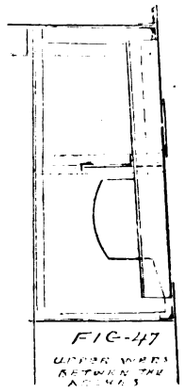
The most earnest pleadings came from the spar deck stringers, who reluctantly acknowledged that they were

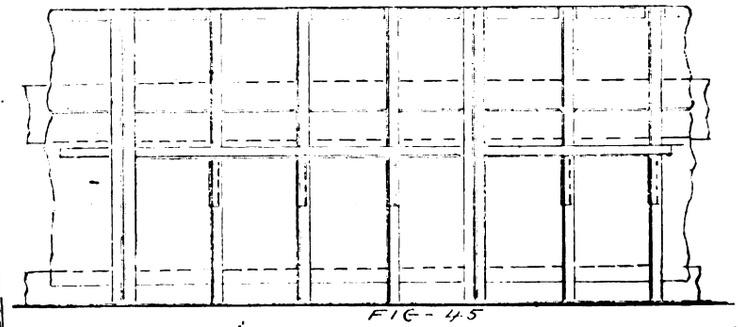
lation completed tables for vessels of 700 feet in length.

The tables are arranged alphabetically from A to M, 13 in number, and occupy 25 pages of the *Book of Rules.*



SUPPORTING STRINGERS PLATES AND THEIR FORE AND AFT ANGLES TO BE EQUAL TO 55 LB. PER LINEAL FT. TABLE G. COLUMN 9. SEC. 85.





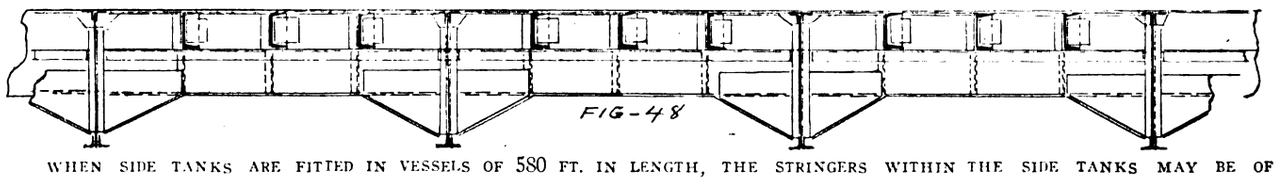
WHEN THE VESSEL'S LENGTH TAKEN BETWEEN THE STEM AND STERN POST IS 580 FT. AND ABOVE, AND SIDE TANKS ARE NOT FITTED, THE CHANNEL BAR FOR TOP SIDE AND HOLD STRINGERS SHOULD BE DISPENSED WITH AND PLATE AND ANGLE STRINGERS AS SHOWN IN FIG. 48 FITTED IN THEIR STEAD.

WHEN BY TABLES G., COLUMN 8, THE SEAM STRAP OR DOUBLING PLATE CONNECTING THE TWO SPARDECK STRINGER PLATES IS 48 IN. WIDE OR MORE, THE SPARDECK STRINGER ANGLE BAR SHOULD BE RE-ENFORCED BY ANGLE BARS OF THE SAME SECTION, BUT SOMEWHAT LESS IN WEIGHT THAN THE TABULAR STRINGER ANGLE BAR, FITTED INTERCOSTAL BETWEEN THE BODY FRAMES FOR TWO-THIRDS THE VESSEL'S LENGTH AMIDSHIPS, THE RIVET HOLES IN THE STRINGER FLANGE TO BE FAYED WITH THOSE OF THE UPPER GUNWHALE BAR AND RIVETED TOGETHER AND TO THE SHEER STRAKE. SEE FIG. 47.

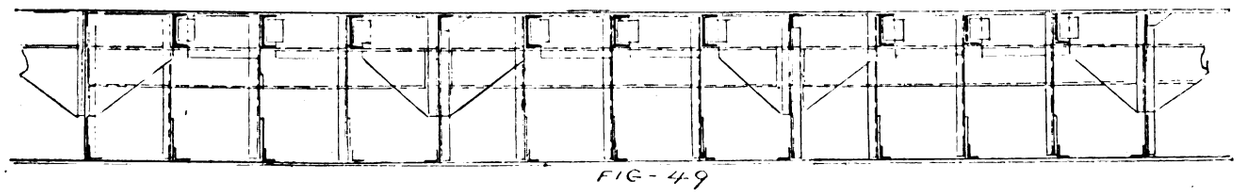
no longer able to do their share of the work without serious risk to the other members of the family. They demanded re-enforcement in the way of heavier and wider seam straps or doubling plates, and that all butts of their various members be secured by double straps the full width of the stringer, including the butts of the seam strap, and that the butt straps be made heavier and fitted with rivets of greater diameter than in the original. They enter a strong protest of the theory that the side tanks in the cargo hold are of any assistance

These tables, together with their writeup from Sections 67 to 92, will be printed on salmon tinted paper that they may be readily referred to, and known as the *Pink Table.*

In order that our *Book of Rules and Regulations* may be in the foremost rank of up-to-date work, we have not only completed rules and tables for the building of the bulk freighter, above mentioned, but have revised our rules and tables of 12 years ago for steel vessels of the package freight type.



WHEN SIDE TANKS ARE FITTED IN VESSELS OF 580 FT. IN LENGTH, THE STRINGERS WITHIN THE SIDE TANKS MAY BE OF CHANNEL BAR FORM SECURED TO WEBS BY STRONG BRACKET AS SHOWN IN FIG. 49.



necessary tests, both in ballast trim and deep loaded, and not found wanting. Our surveyors who attended on these vessels during their building have repeatedly examined them since they have been in commission and their reports filed at the society's office, show that the majority of them are doing the work without complaint.

Some few there are that have shown signs of distress, and like "Kipling's Ship," the disgruntled members

to them situated as the side tanks are near the neutral axes of the structure far below the spar deck stringer, all of which the committee have considered in compiling the tables.

As these larger vessels are handled by the lake captain, with apparently less mishaps than with their late command of half the size. It is possible that much larger vessels of the kind will be built. With this in view, the committee has by careful interpo-

DULUTH GRAIN TRADE.

Duluth, Oct. 23.—Grain receipts and shipments at Duluth for the week ending Oct. 19, 1907, were as follows:

	Receipts.	Shipments.
Wheat	2,682,644	2,265,127
Corn	4,986	.....
Oats	136,369	101,873
Rye	48,214	27,997
Barley	791,674	1,420,087
Flax	864,786	699,788

Sandusky Bay outside gas buoy No. 2, reported extinguished, has been relighted.

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QUESTIONS FOR MASTERS AND MATES.—NO. 46.

625. Engine disabled how would you keep your boat out of the trough of the seas with the equipment on board an ordinary lake freighter?

626. What is the easiest position a steamer will weather a gale?

627. What does knot indicate, speed or distance?

628. Is it necessary to say so many knots per hour?

629. Is it necessary to say so many miles per hour?

630. In your opinion do you think that by the use of oil in heavy gales it would assist in preventing many of the accidents that occur on the lakes?

631. How much faster is the mean sun time at Cleveland than at Chicago?

632. In lake vessels what is the increase or decrease of the magnetism of steel hulls mostly due to?

633. Is it important to reverse a new steel hull after launching and leave it so while the finishing is being done?

634. Why?

QUESTIONS FOR WHEELSMEN AND WATCHMEN.

TWENTIETH INSTALLMENT.

225. What is a timber-hitch and how is it made?

226. What is a clove-hitch and how is it made?

227. What is a timber-hitch and a half-hitch?

228. What is a carrick bend and how is it made?

229. What do you understand by Rule 22?

230. Draw a diagram showing a sailing vessel on the starboard tack and the direction of the wind.

231. Draw a diagram of a vessel running free.

232. What do you understand by Rule 27?

233. How do you understand Rule 9?

234. If you were steering E x S with the wind and sea running from the NNW, how would the sea strike the ship?

235. How would you take care of a lead line to keep it in the best of condition?

ANSWERS TO QUESTIONS FOR WHEELSMEN AND WATCHMEN.

EIGHTEENTH INSTALLMENT. PUBLISHED OCT. 10.

201. On the starboard side.

202. Going in from seaward red buoys mark the right hand side of the channel and black buoys the left hand side.

203. Indicates a channel on either side of it.

204. On the starboard side.

205. A steady light; one that shows continuously.

206. Sand (sand bottom).

207. Life-boat.

208. A can buoy has a round top like a ball and sometimes a flat top while a nun buoy is more on the cone shape, both on its top and bottom; a can buoy is cone shaped on the bottom.

209. On the port side.

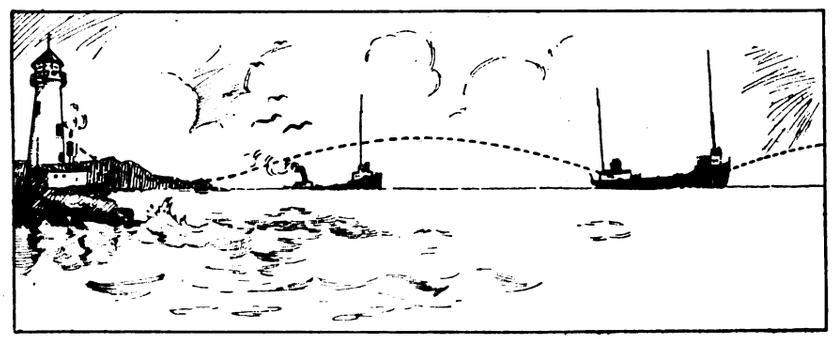
210. That it should be left to starboard.

211. 6 feet.

212. 120 feet.

SOUND "SHADOWS" IN FOG.

The following illustration depicting the probable deflection of sound waves and how "shadows" or inaudible zones occur will prove of interest, since the subject has been discussed at some length through the columns of the MARINE REVIEW. Colonel Anderson's contribution to the discussion has been received with a great deal of interest. Colonel Anderson is chief of the engineer's office, Department of Marine and Fisheries, Ottawa, Canada, and having built so many Canadian lighthouses, his experiences and experiments have brought him in close touch with this subject, all of which contribute to the value of his thoughts and statements. It may not be out of place to also state that Colonel Anderson is a Fellow of the Royal Geographical Society.



SHOWING SOUND SHADOWS, OR SOUND WAVES RICOCHET.

As is already known repeated experiments have proven that sound in fog is erratic, and that mariners run a grave peril when they trust to fog signals alone. The reason for this ungentlemanly behavior of sound is designated as "sound shadows," within which the ear detects no trace of the signal, although the fog signal may be blowing continuously, and the sound therefore is perfectly audible on all sides of the shadow. In many cases the cause of a sound shadow can easily be discovered. The existence of a bluff behind the whistle sometimes makes the sound waves ricochet in a bounding manner over the water, perfectly audible at say one mile, inaudible at two miles, and distinctly heard again at three miles. It is impossible to trace the origin of many sound shadows because they are doubtless due to some peculiar condition of the atmosphere.

A STRONG ENDORSEMENT.

The following letter will explain itself without further introduction:

Mr. Clarence E. Long, MARINE REVIEW:

Dear Sir—I am in receipt of your Course Finder, Deviation Log and Deviation Diagram and its book of explanations. I can assure you that they are very useful and necessary articles; and I do not believe that any pilot should be without them. The Course Finder should be the property of everyone studying for papers. I had contemplated a book similar to your Course Finder, and I am pleased to congratulate you on its efficiency. I have used Baxter's Diagram for some time, but I think your Course Finder and Deviation Diagram much simpler. In compiling such a work slight mistakes are liable to occur, which may be observed by proving the course. I regard them as important aboard ship as the sun compass itself.

Very truly yours,

E. O. WHITNEY,

Master Str. Samuel F. B. Morse.

Capt. R. Richoldt has resigned as master of the Brazil, and Capt. William Mackin, who had charge of the Bulgaria, has been appointed in his place. Capt. D. A. Kendall has taken charge of the Bulgaria.

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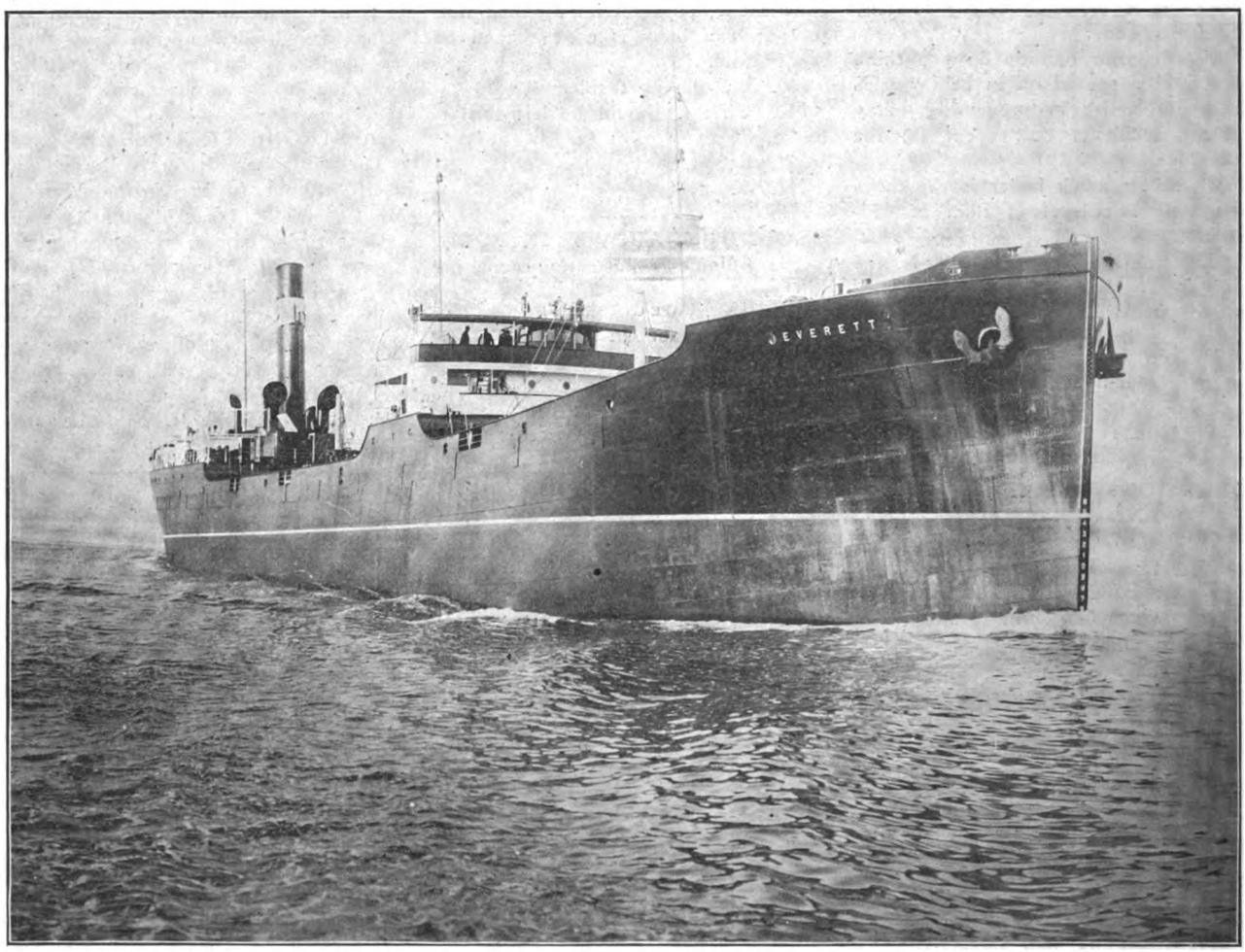
BUILDERS' TRIAL OF COLLIER EVERETT

Quincy, Mass., Oct. 16.—The big new steel steam collier Everett, built by the Fore River Ship Building Co., had her builders' trial today and realized the expectations of her designers and constructors by developing a speed of 12.12 knots and demonstrating in every way her capabilities for the business in which she will be engaged. The ship was built for good hard service, rather than for speed, but the fact that she did a knot and a fraction better than her contract called for was very gratifying to her builders.

Yesterday evening the final dock trial of the ship's engines was had and then all hands turned in to be up bright and early this morning, for the ship was to go down Fore river on the early tide. It was half past six when Port Capt. Evans of the Fore River Ship Building Co., who was in command of the vessel, backed her away from the dock. Safely negotiating the narrow channel and the draw-bridge in Fore river, the Everett headed out into Boston harbor and the first vessel to salute her was the turbine steamer Yale hurrying into Boston on her trip from New York. The Everett was abeam of Boston lightship at exactly 7:54 o'clock and the test was on. Her contract called for an average speed of 11 knots an hour, for four hours, the ship to be loaded with 300 tons of bunker coal, 25 tons of fresh water and stores, and all water ballast tanks filled. Under these conditions the test began, the total weight of the water ballast being 3,030 tons. She drew 12 ft. 1½ in. forward and 18 ft. 9½ in. aft. The morning was cool with a fresh breeze from the northwest. Capt. Evans lay his course northeast and the ship moved steadily through the water toward the whistling buoy off Thatcher's Island, a distance of 20⅜ miles.

When she reached Thatcher's Island buoy, the chronometers were watched, the time taken, and it was seen that the vessel had developed a speed of 12.12 knots, a most gratifying showing. The ship kept on her course until off the Salvages, when Capt. Evans turned and made a letter S, showing the great ease with which the vessel can be steered. The return over the course was begun at the Thatcher's Island buoy at 10:06 o'clock and was finished at Boston lightship at 11:49 o'clock, and on this run she developed a speed of 11.8 knots.

Her average main steam pressure for



THE COLLIER EVERETT ON HER BUILDERS' TRIAL, OCT. 16, 1907, WITH ALL WATER BALLAST TANKS FILLED TO A TOTAL WEIGHT OF 3,000 TONS; 300 TONS OF BUNKER COAL AND 25 TONS OF FRESH WATER AND STORES, SHOWING THE IMMERSION OF THE VESSEL WHEN RUNNING LIGHT.

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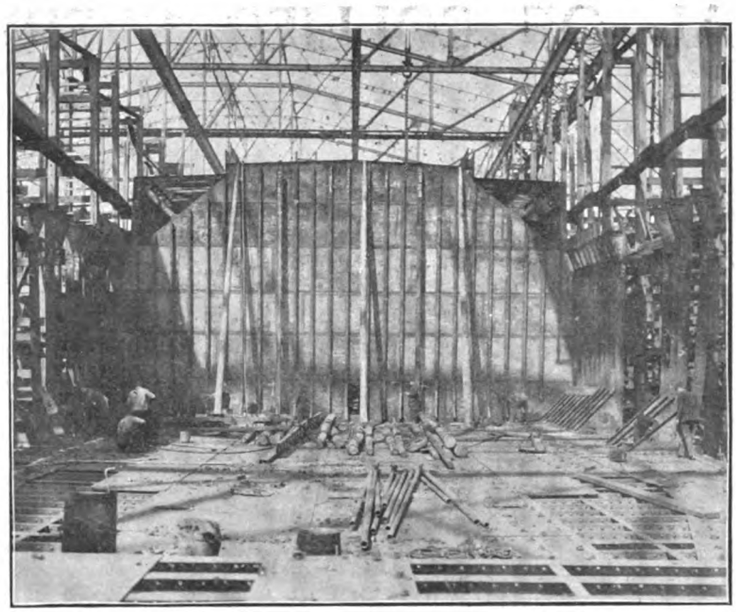


ONE OF THE WATERTIGHT BULKHEADS, SHOWING THE SHAPE OF THE HOLD AND THE TRIANGULAR SHAPED WATER BALLAST TANKS AT THE TOP AND SIDES.

the four-hour run was 160 lbs., and the average revolutions per minute of the main engine for the four-hour run was 70.7.

After completing this run the ship slowed down off Boston light and her two anchors were lowered and hoisted. On the starboard anchor 30 fathoms of chain cable were taken in by the big winch in 7 minutes and 5 seconds.

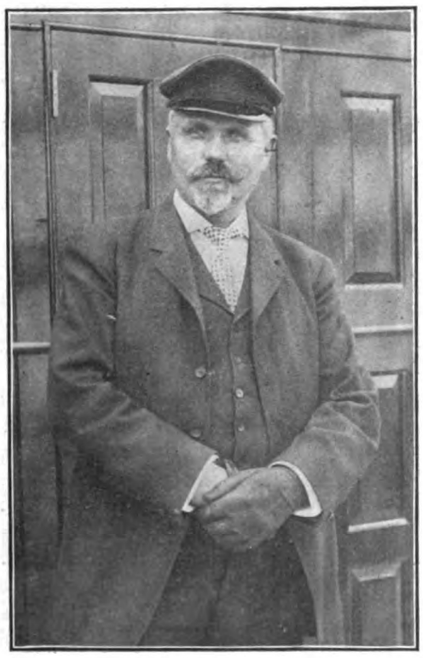
The top side ballast tanks, 10 in number, were also emptied and the time consumed was exactly 40 minutes. There are five of these tanks on each side of the vessel and they carry water as follows:

Tank No.	Tons of water.
1	120
2	106
3	98
4	98
5	99

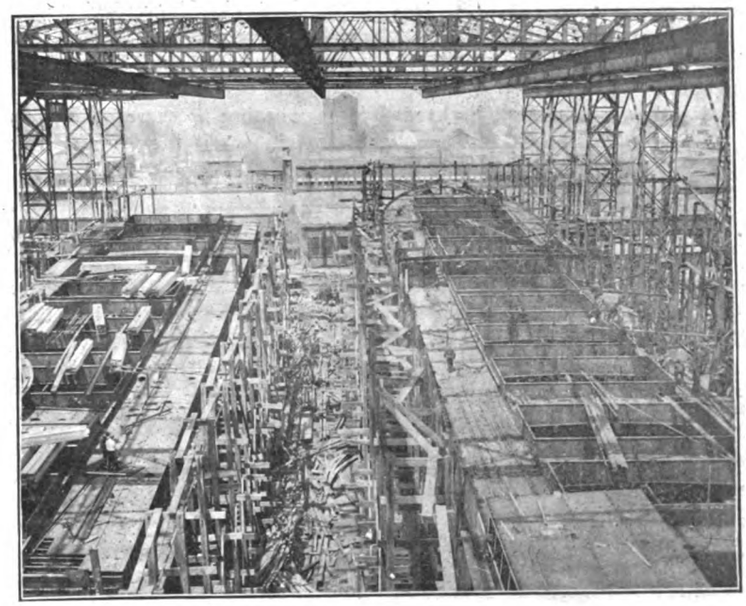
The fore peak tank holds 465 tons and the after peak tank 134 tons. The tanks in the double bottom contain water as follows:

Tank No.	Tons of water.
1	199
2	266
3	247
4	247
5	239
6 (fresh water)	126
7	61

Total weight of all water ballast, 3,030 tons.



CAPT. P. FROSTEAD
Who will command the Everett.



THE EVERETT ON THE STOCKS, SHOWING THE TEN LARGE HATCHES OPENING INTO THE FIVE BIG HOLDS, WITH A TOTAL CAPACITY OF 7,200 TONS OF COAL.

The Everett reached the yard of the Fore River Co., at 2:35 p. m., her siren whistle screeching the message to the men in the yard that the ship had done all that was expected of her. President F. T. Bowles, of the Fore River Ship Building Co., said: "It was a very satisfactory trial. The ship has given every evidence of an ample margin of speed over and above the contract." Charles Skentelbery, marine superintendent of the Massachusetts Steamship Co., for which the vessel was built, said: "We had a good trial trip. Everything so far as we can see is very satisfactory. She certainly is a fine ship."

The engine room force on this trial was made up entirely of Fore River men under the supervision of Chief Engineer Edwards and Engineer Paige. On board the vessel were: President Bowles, Electrician Engineer Crain, of the Fore River Ship Building Co.; Marine Superintendent Skentelbery, of the Massachusetts Steamship Co., and Messrs. Linden Stuart and John R. Middleton of his staff; Miles Erb, chief engineer of the powerhouse, and James Lyman, chief engineer of coal operating machinery of the N. E. Gas & Coke Co.; Capt. W. E. Hadlock, the compass adjuster; Capt. W. M. Smith and Capt. A. Abbott, who will command the Malden and Melrose, sister ships of the Everett soon to be launched, and the following officers who will be on the Everett when she goes into service: Captain, P. Frostead; first officer, A. McGray; second officer, E. H. Holland; third officer, A. H. Anthony;

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chief engineer, A. Mearns; first assistant, W. K. Queen; chief steward, Philip Harris.

The Everett was built for the Massachusetts Steamship Co., and will be used for carrying coal between Boston and southern ports. She is an important addition to the American merchant marine, as her equal in ships of her class does not exist under the American flag. There are two other ships of the same size and type building at Fore River for the same company. One, the Malden, was launched on Sept. 10, the other, the Melrose, is nearly ready for launching. These three colliers will work a great change in the tide water coal carrying trade of the North Atlantic seaboard. The reasons for this were shown in his remarks made at the launching of the Everett by President James L. Richards, of the New England Gas & Coke Co., for which company these vesesls will be in service. After a reference to the unsatisfactory method of transporting coal by sailing ships and in barges towed by tugs and the delay at the loading and unloading points, the consequent demurrage and other costs Mr. Richards said:

"We finally concluded that, taking everything into consideration, the most economical method of transportation would be by a steel steam collier carrying about 7,000 tons in addition to coal for its own requirements."

The contract for three colliers of this type was made by the Fore River Ship Building Co, on Oct. 26, 1906. The keel of the Everett was laid on Jan. 22, 1907. She was launched July 11, 1907. She is particularly suited for deadweight cargoes which can be loaded by means of chutes and discharged by mechanical grabs. There are ten exceptionally large hatchways each 28 ft. wide and 14 ft. long, with two hatches to each of the five cargo holds, which latter are each 48 ft. long. She is 400 ft. long with an extreme breadth of 53 ft., a depth of 32 ft. and a gross tonnage of 5,107 tons.

The special feature in her construction is known as the self-trimming system.

She is of the single deck type, with single screw and triple expansion surface condensing engine and four single-ended Scotch boilers constructed for a working pressure of 180 lbs. All the machinery is located aft. She has a crew of thirty-five men all told. Exceptionally powerful pumps enable the vessel to discharge all water ballast tanks in six hours.

An inspection of the ship will open the eyes of seafaring men for there was never such equipment and appointments in a collier. The quarters of the deck officers and engineers are finer than in many passenger ships. The pilot house and bridge are particularly handsome structures, being finished in natural teak. There are bath rooms, toilet rooms, electric lights, telephones and all such conveniences. On the flying bridge is a powerful electric searchlight. One of the ship's boats is equipped with a gasoline engine which can be used in going ashore and for many other purposes. The quarters of officers and men are heated by steam. The vessel is very handsomely painted; her railings in aluminum, her name in gold leaf. She has towing bitts and towing rail aft. She has two metal life boats, a gig and a dinghy. The Everett is completely fitted out with flags, stores, bedding, linen, dishes and ware and ready for immediate service.

FOUR LAKE LAUNCHINGS

The steel steamer Josiah G. Munro, building for the Frontier Steamship Co., North Tonawanda, N. Y., of

MISS MARION H. SEAVEY, SPONSOR, LEAVING THE LAUNCHING STAND.

which W. M. Mills is manager, was launched at the Ecorse yard of the Great Lakes Engineering Works on Saturday morning last. There have been many quick and successful launches at lake yards, but this was the speediest of them all, taking place the instant that the launching party reached the stand and with a suddenness that caught every photographer on the grounds unawares. Miss Marion H. Seavey, of Boston, granddaughter of the man in whose honor the steamer was named, was not, however, caught napping, smashing the bottle vigorously across the steamer's bow. So quickly, however, was the whole thing done that it is safe to say that the steamer was in the water before half the launching party had time to turn their heads around to look at it. Immediately after the launching the ship building company tendered a luncheon to the guests at the Detroit Club, Harvey H. Brown, of Buffalo, acting as toastmaster.

The speech of Josiah G. Munro was easy, natural and affecting. He considered the naming of the ship after him the greatest honor of his business life and he only wished that he had words fitting to express his appreciation to the younger element which had conferred this honor upon him. He added that he would always think of the steamer as a shuttle in the loom of the great lakes, weaving the fabric of internal commerce. He expressed his regret that there were not similar

MR. JOSIAH G. MUNRO ON THE LAUNCHING STAND.

looms for our over-sea trade, saying that our position as carriers in the foreign trade, which was supreme fifty years ago, has now practically

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TWO VIEWS OF THE MUNRO LAUNCHING PARTY.

vanished. He felt this to be a condition that cried aloud for remedy.

Antonio C. Pessano, president of the Great Lakes Engineering Works, in responding to a toast said he could not foresee the time when lake ship builders would not have a ship to build. The natural increase of commerce is 5,000,000 tons per annum. A ship, such as the Josiah G. Munro, will carry 200,000 tons of this in a season, but it will require thirty-five ships like her to carry the 5,000,000 tons and, in point of fact, when the natural wastage of older vessels is considered it will require forty-one ships like her, which is about all that the lake ship builders can comfortably build in a year. He thought these figures, while taking care only of the natural increase from year to year, gave a good idea of the great transportation business of the central west, a circumstance which eastern people do not appreciate and which he himself did not realize until five years ago when he came west himself.

The speech of W. A. Rogers was especially felicitous. He thought the Josiah G. Munro would be one of the best advertised ships on the lakes. He doubtless had in mind the advertising that the W. A. Rogers received when she started on her career as a record cargo breaker a year or more ago. He related that the Josiah G. Munro would shortly be emblazoned as having carried the largest cargo of coal that ever left Sandusky; that never before was such a cargo delivered in the harbor of Cheboygan; no such cargo of ore ever left Escanaba for South Chicago; nor from Fort William or Port Arthur were ever such cargoes of grain carried before. He added that if the ship partook of any of the qualities of the man after whom it is named it will be a very good ship. Josiah G. Munro as a business manager has always taken good care of his friends. Mr. Rogers therefore predicted that the steamer would declare good dividends. He thought also that in fuel consumption she would be very low, illustrating it by saying that he had persistently for many months invited Mr. Munro to luncheon in order to discover how many excuses a man could invent for declining, and as far as he could personally testify Mr. Munro never ate. The Josiah G. Munro therefore would operate upon an exceedingly moderate consumption of fuel.

Mr. Rogers had in his talk used certain biblical quotations which caused Mr. Livingstone, president of the Lake Carriers' Association, to remark that iron men must be somewhat different from steamboat men as steamboat men generally resorted to the scriptures only in times of trouble. As Mr. Livingstone's toast was upon the commerce of the lakes he said that he had no fears of its future prosperity and that it was growing so rapidly that even half a dozen years back if any one predicted a steamer of the size of the Josiah G. Munro he would be regarded as a lunatic.

W. M. Mills upon being called upon stated that for eighteen years Mr. Rogers had been teaching him to keep his tongue still. After a few remarks by Hugh Kennedy a toast to the sponsor closed the speaking.

Those present at the launching were: Miss Marion H. Seavey, Mrs. Wm. M. Seavey, Mrs. Wm. H. Seavey, Miss M. H. Munro, Mrs. M. R. Richards from Boston; Josiah G. Munro, Mrs. Munro, Capt. and Mrs. J. J. H. Brown, Harvey L. Brown and Mrs. Brown; Wm. A. Rogers, Hugh Kennedy, Miss Rachel Kennedy, W. J. Fredericks, E. W. Stith, from Buffalo; L. S. DeGraef and Mrs. DeGraef; Mr. and Mrs. W. M. Mills, Mr. and Mrs. McKenzie, Master McKenzie, Mr. and Mrs. John A. Stitt, J. J. Patterson, George Vandervoort, from North Tonawanda; B. J. Stedman from Batavia, N. Y.; E. P. Lenihan, James Nacey, from Cleveland; Mrs. H. N. Sturms, from Ann Arbor; Mrs. W. T. Bradford, Miss Bradford, Wm. Livingstone, Mr. and Mrs. Clark, Antonio C. Pessano and John R. Russel, from Detroit.

The steamer Josiah G. Munro is practically a duplicate of the J. H. Sheadle, differing in a few minor details. She is 550 ft. over all, 530 ft. keel, 56 ft. beam and 31 ft. deep, having thirty-two hatches spaced 12 ft. centers. Her engines are triple-expansion with cylinders 23, 37 and 63 in. diameters by 42-in. stroke, supplied with steam from two Scotch boilers,

(Continued on page 32.)

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THE THEORY AND PRACTICE OF LAKE NAVIGATION

BY CLARENCE E. LONG

POSITION FINDING CONTINUED.

ANSWERS TO BEARING PROBLEMS.

1. 3 1-3 miles ESE ¾ E.—4-point bearing.

2. 3.87 miles—a 4-point bearing.

3. 2.38 miles—a 2½-bearing.

4. 3¾ miles nearly—a 5-bearing.

5. 6 miles SSE of the light on the 2-point bearing; 4.2 miles when abeam. The two together are the combination of the 2-point and 4-point bearings.

6. 2.87 miles SW by W ½ W—a 3-point bearing.

7. 3.2 nautical miles.

8. 10⅛ miles from Pilot Island; 9¾ miles from Cana Island.

9. 5 min. 16 sec.

10. 4 min. 54 sec.; 4 min. 39 sec.; 6 min. 40 sec.; 6 min. 14 sec.; 5 min. 23 sec.; 5 min. 51 sec.; 4 min 31 sec.; 6 min. 51 sec.

11. 13.27 miles.

12. 11.1 miles.

13. 3½ miles from the lighthouse; correct magnetic course SW by S; compass course SW ¼ S; a scalene triangle bearing.

14. 5¼ miles from North Manitou; 7 miles from South Manitou.

15. 8¾ miles from Cana Island; 7⅞ miles from Pilot Island; NNE ¾ E—24¼ miles.

16. 8½ miles from Manitowoc; 7¾ miles from Twin River Pt.; E by N to Manistee.

17. (a) 14½ miles, nearly, per hour. (b) 21¾ knots; (c) probably the blades of the rotator have too much pitch, or the rotator slips—turn blades in slightly; (e) W by S; (f) one point forward of the starboard beam.

18. 19 hrs. 22 min.; 176.6 knots.

19. 6 hrs. 9 min., nearly.

20. 5 hrs. 29 min.

21. 4.4 miles.

22. (a) 1826 ft.; (b) 91.3 ft.; (c) 1,013 1-3.

23. (a) compass course N by E ¾ E; (b) 2.1 miles; (c) port a quarter of a point—3° if steering to degrees; (d) 4 miles from Pilot Island; (e) port a point; (f) compass course NNE ⅝ E; (g) 5.9 miles; (h) 4 miles.

Example.—The vessel is steaming 12 miles an hour steering S ½ E; at 10 o'clock Port Sanilac bears abeam—W ½ S—and at 10:15 it bears 2½ points abaft the beam—WNW; how far is the ship from the light at 2d bearing? Answer, 6 miles. Twice the distance run is the distance the ship is from the light. This is the Dodge bearing used abeam and 2½ points abaft the beam; twice the distance run being the distance from the object. This is a very serviceable bearing, and can be employed to advantage in many cases. The distance from the object at 2d bearing represents the hypotenuse of a right-angled triangle, in which the bearing abeam is the perpendicular and the course the base, the base being just one-half the hypotenuse, so that in doubling it we get the length of the hypo.

Ex.—You are logging 12½ miles an hour, and at 9 o'clock Point aux Barques bore 37° on the bow, and at 9:45 it bore abeam. Required the distance from the light when abeam. Ans. 7 miles (9.37 × .75).

Bear in mind that it is only the scalene and cross-bearings that have to be plotted on the chart, in order to find the ship's place.

How to correct these compass bearings to turn them into their corresponding true bearings, so that when they are traced on the chart they will agree therewith:

The ship is steering NE at the time a lighthouse bore NW by N and at the same time a point of land bore W½N by compass. The Dev. for NE ¾-pt. Ely. and the Var. at place of ship is ¼-pt. Ely.

Lighthouse.

Compass bearing NW by N =	3 pts. L [of N
Deviation Ely	¾ pts. R
Correct Magnetic bearing	2¼ pts. L [of N
Variation Ely	¼ pts. R
True Bearing	2 pts. L [of N or [NNW

Point of Land.

Compass bearing W½N =	7½ pts. L [of N
Deviation Ely	¾ pts. R
Correct Magnetic bearing	6¾ pts. L [of N
Variation Ely	¼ pts. R
True Bearing	6½ pts. L [of N or [WNW [½W

The true course the vessel is steering is NE by E. This can all be done mentally. Remember that in plotting any kind of a bearing on a chart if it is taken by compass you must allow for the Dev. and Var. to make it true so that it will agree with the chart. In a case of this kind, remember that Dev. and Var. Ely allow to the right of the bearing by compass, and Dev. and Var. Wly allow to the left of the bearing by compass. The best way to do this is to set the Pelorus to the true course that the vessel is steering, and then all bearings taken by it will be true bearings, and they need no further correction, but can be laid right on the chart. Thus, in the above case the vessel is steering NE by compass, but the true course is NE by E; if the Pelorus were set to this course and the lighthouse and point of land taken, the bearings would be identical with those corrected for the Dev. and Var. This is another wrinkle worth knowing.

FOUND GEOGRAPHICALLY.

It must be plainly seen that these various methods of one object bearings are formed by various triangles of different descriptions, and that they are computed by geographically finding two sides of the triangle where the third side and two angles are known; and it must also be clear that the correct solution of the problem in every case depends on the course and distance made good over the ground, and not merely the course steered by compass and the distance run by log, both of which ignores current and leeway, and in consequence could be in error on this account. The vessel although steering the same constant course can actually be carried to one side or the other of her course by these agencies. If in the direction of the course made good a shoal or reef is found, and the vessel maintains her course, stranding is certain to occur.

TIME AND SPEED TABLE.

The following table shows the number of minutes and seconds that are required for the ship to make various speeds. The speed is given from 5 to 18 miles an hour, and will answer for the purpose intended. We have added this table merely to help the learner prove his work, and it is not intended that he should work from the table alone, but use it as a proof after he has worked the example relating thereto:

Speed Per Hour. Miles.	Time Per Mile. Min.	Sec.	Minutes and Decimal of a Minute Per Mile.
5	12		
5¼	11	26	11.4
5½	10	54	10.9

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5¾	10	26	10.4
6	10		
6¼	9	36	9.6
6½	9	14	9.2
6¾	8	53	8.9
7	8	34	8.6
7¼	8	16	8.3
7½	8		7.7
7¾	7	44	7.5
8	7	30	7.3
8¼	7	16	7.1
8½	7	3	6.8
8¾	6	51	6.7
9	6	40	6.6
9¼	6	29	6.5
9½	6	19	6.3
9¾	6	9	6.1
10	6		
10¼	5	51	5.8
10½	5	43	5.7
10¾	5	35	5.6
11	5	27	5.4
11¼	5	20	5.3
11½	5	13	5.2
11¾	5	6	5.1
12	5		
12¼	4	54	4.9
12½	4	48	4.8
12¾	4	42	4.7
13	4	37	4.6
13¼	4	31	4.5
13½	4	26	4.44
13¾	4	22	4.36
14	4	17	4.28
14¼	4	13	4.2
14½	4	8	4.13
14¾	4	4	4.06
15	4		
15¼	3	56	3.93
15½	3	52	3.87
15¾	3	48	3.8
16	3	45	3.75
16¼	3	41	3.69
16½	3	38	3.63
16¾	3	35	3.58
17	3	32	3.53
17¼	3	29	3.48
17½	3	26	3.43
17¾	3	23	3.38
18	3	20	3.33

GET ACQUAINTED WITH SIMPLE PROPORTION.

The student should understand Simple Proportion; he must already see its importance. A knowledge of it will facilitate the work of finding the distance from the time that the ship has run between bearings, and it will also do away with the long operations of ordinary Arithmetic.

SOLUTIONS OF PLANE RIGHT-ANLED TRIANGLES.

The following table shows the length of the perpendicular and base for a given hypotenuse, or vice versa, for angles of from ¼ point to 4 points of the compass. The length of the hypotenuse are given for from 5 to 20 miles, which will answer for the purposes intended:

Angle of ¼-Pt.			Angle of ½-Pt.			Angle of ¾-Pt.		
Hypo	Perp	Base	Hypo	Perp	Base	Hypo	Perp	Base
5	5.0	0.2	5	5.0	0.5	5	4.9	0.7
6	6.0	0.3	6	6.0	0.6	6	5.9	0.9
7	7.0	0.3	7	7.0	0.7	7	6.9	1.0
8	8.0	0.4	8	8.0	0.8	8	7.9	1.2
9	9.0	0.4	9	9.0	0.9	9	8.9	1.3
10	10.0	0.5	10	10.0	1.0	10	9.9	1.5
11	11.0	0.5	11	10.9	1.1	11	10.9	1.6
12	12.0	0.6	12	11.9	1.2	12	11.9	1.8
13	13.0	0.6	13	12.9	1.3	13	12.9	1.9
14	14.0	0.7	14	13.9	1.4	14	13.8	2.1
15	15.0	0.7	15	14.9	1.5	15	14.8	2.2
16	16.0	0.8	16	15.9	1.6	16	15.8	2.3
17	17.0	0.8	17	16.9	1.7	17	16.8	2.5
18	18.0	0.9	18	17.9	1.8	18	17.8	2.6
19	19.0	0.9	19	18.9	1.9	19	18.8	2.8
20	20.0	1.0	20	19.9	2.0	20	19.8	2.9

Angle of 1-Pt.			Angle of 1¼-Pt.			Angle of 1½-Pt.		
Hypo	Perp	Base	Hypo	Perp	Base	Hypo	Perp	Base
5	4.9	1.0	5	4.9	1.2	5	4.8	1.5
6	5.9	1.2	6	5.8	1.5	6	5.7	1.7
7	6.9	1.4	7	6.8	1.7	7	6.7	2.0
8	7.8	1.6	8	7.8	1.9	8	7.7	2.3
9	8.8	1.8	9	8.7	2.2	9	8.6	2.6
10	9.8	2.0	10	9.7	2.4	10	9.6	2.9
11	10.8	2.1	11	10.7	2.7	11	10.5	3.2
12	11.8	2.3	12	11.6	2.9	12	11.5	3.5
13	12.8	2.5	13	12.6	3.2	13	12.4	3.8
14	13.7	2.7	14	13.6	3.4	14	13.4	4.1
15	14.7	2.9	15	14.6	3.6	15	14.4	4.4
16	15.7	3.1	16	15.5	3.9	16	15.3	4.6
17	16.7	3.3	17	16.5	4.1	17	16.3	4.9
18	17.7	3.5	18	17.5	4.4	18	17.2	5.2
19	18.6	3.7	19	18.4	4.6	19	18.2	5.5
20	19.6	3.9	20	19.4	4.9	20	19.1	5.8

Angle of 2 Pts.			Angle of 3-Pts.			Angle of 4-Pts.		
Hypo	Perp	Base	Hypo	Perp	Base	Hypo	Perp	Base
5	4.6	1.9	5	4.2	2.8	5	3.5	3.5
6	5.5	2.3	6	5.0	3.3	6	4.2	4.2
7	6.5	2.7	7	5.8	3.9	7	4.9	4.9
8	7.4	3.1	8	6.7	4.4	8	5.7	5.7
9	8.3	3.4	9	7.5	5.0	9	6.4	6.4
10	9.2	3.8	10	8.3	5.6	10	7.1	7.1
11	10.2	4.2	11	9.1	6.1	11	7.8	7.8
12	11.1	4.6	12	10.0	6.7	12	8.5	8.5
13	12.0	5.0	13	10.8	7.2	13	9.2	9.2
14	12.9	5.4	14	11.6	7.8	14	9.9	9.9
15	13.9	5.7	15	12.5	8.3	15	10.6	10.6
16	14.8	6.1	16	13.3	8.9	16	11.3	11.3
17	15.7	6.5	17	14.1	9.4	17	12.0	12.0
18	16.6	6.9	18	15.0	10.0	18	12.7	12.7
19	17.6	7.3	19	15.8	10.6	19	13.4	13.4
20	18.5	7.7	20	16.6	11.1	20	14.1	14.1

THE TRAVERSE TABLES.

The foregoing tables are nothing more than a portion of the data contained in the traverse tables, which by mere inspection the navigator, in sailing vessels on the ocean, employes for working out his dead reckoning. By such tables the solution of right-angled triangles is accomplished by mere inspection. In the regular traverse tables "Dist." (distance) is substituted for Hypo (hypotenuse); "Lat." (meaning difference of latitude, north or south) for Perp (perpendicular), and Dep. (departure eastings or westings) for base; that is, hypo represents the distance; perp the meridian, and base a parallel on the chart. For example:

DIFF. LAT. AND DEP.

Supposing that you steered NE by N 15 miles, what is the diff. of lat. and dep., that is, what distance has the vessel made north and east while sailing constantly on a NE by N course for 15 miles. As NE by N is a 3-point course, look for angle of 3-points in the above table and against 15 in hypo. column will be found 12.5 in perp. column and 8.3 in base column, which means that to sail NE by N 15 miles the vessel changes her latitude 12.5 minutes or nautical miles, and her dep. 8.3 minutes or nautical miles; or she makes 12.5 nautical miles in the direction of north or 12.5 miles of northing and 8.3 in the direction of east, or 8.3 miles of easting, in sailing 15 miles NE by N. This holds good for any 3-point course, and also for the complement of a 3-point course, or a 5-point course, by assuming the base to be the perpendicular and the perpendicular to be the base under angle of 3-points. For example: supposing the course was 15 miles NE by E, which is a 5-point course, the vessel would make 12.5 miles of easting and 8.3 miles of northing. This is plain for when the course is more than 4 points the dep. is greater than the diff of latitude, because we go more east or west than north or south. We can also see that the relations of the two elements are simply reversed. See diagrams. In a 5-point course, the diff. of lat. is the same as the dep. in a 3-point course, the complement of a 3-pt. course (3 from 8 is 5, 8 being the right angle, or 90°, and the complement of an angle is what it lacks of being 8 points or 90°). Hence, in using the tables, as soon as you have a course of over 4 points, you begin at the bottom and read up, noting that while the dist. remains in the same place lat. and dep. are reversed; but this has nothing to do particularly in the manner in which we employ them in off-shore distance finding.

The following table will explain the system of the traverse tables. The above example is illustrated:

3-Point Course—NE by N.

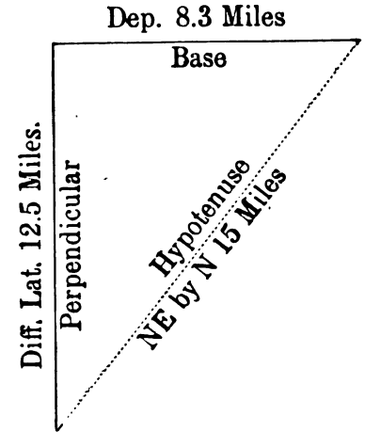
Dist.	Lat.	Dep.
15	12.5	8.3

Dist.	Dep.	Lat.

5-Point Course—NE by E.

SMALL SECTIONS OF THE EARTH FLAT.

These tables are on the assumption that small sections of the earth's surface are flat. and so they are for



all practical purposes of navigation. Then, it is plain to be seen that the

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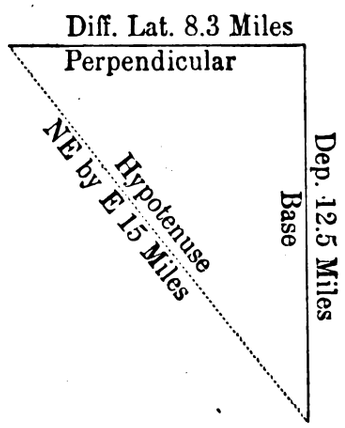
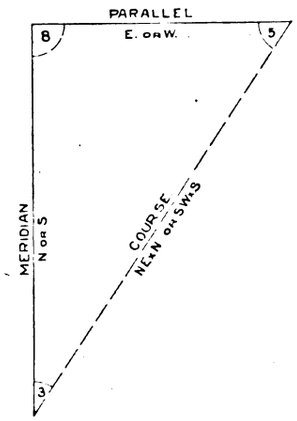
whole matter resolves itself into the solution of right-angled triangles. A glance at any sailing chart which has the courses printed on it will show at once that any course unites with the parallels and meridians in forming series of right-angled triangles. The only cases in which no such triangles exist are those of east and west and north and south. In the



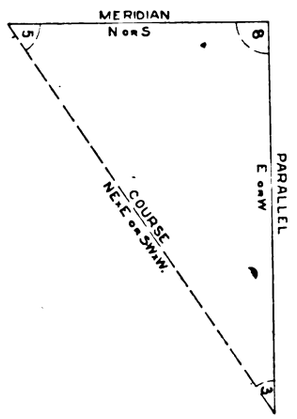
latter case whatever distance the vessel sails in nautical miles represents minutes of latitude. In the case of east and west the matter is not so simple, because only on the equator are a nautical mile and a minute of longitude the same thing. But by means of the table on page 211, which contains the number of miles in a degree of longitude at every distance



north or south of the equator—which means in every latitude—we can easily find the longitude. For instance, a ship in Lat. 42° N sails true east 100 miles; how much does she alter her longitude? A degree of long. in lat. 42° measures 44.7 nautical miles, nearly; hence, she changes her long. by 2° 13′ 48″. On the parallel of 60° a degree of longitude measures 30 miles, so that for every 30 miles sailed east or west the long. is changed 1°. In the above example to sail 100 miles on this parallel the vessel would change her long. by 3° 20′. If a vessel by sailing either east or west on the parallel of 60° changes her long. 5°, how many miles has she had to sail in order to do it ? 5×30=150 miles.

This same information is contained in the hypo., perp. and base tables, but in order to show it we will have to assume examples that will conform to the table on account of its extreme small limits, as compared with distances on the globe. The above tables are intended for these purposes, but in order to show some of the many things that can be performed by means of them we mentioned this one, hence the student that is desirous of further information on the subject will know how to go ahead in order to accomplish it.

Supposing a vessel on the parallel of 45° sails 14.1 knots, how many



minutes has she changed her longitude, that is, minutes of arc. Rule.—With the latitude of the parallel as a course (the angle in the table) and the distance sailed as perp. enter the above table and the corresponding hypo. will be the diff. of long. required.

FOUR LAKE LAUNCHINGS.

(Continued from page 29.)

15 ft. in diameter and 11 ft. 6 in. long. She is built on the girder system and her hull construction is unusually rigid. In the line of auxiliaries she will have the Akers emergency steam steering gear, which is coming to be regarded by competent vessel owners as an indispensable auxiliary on these great steamers. She will have Hyde steering gear and windlass and Chase mooring engines. Her dynamos will be of the General Electric Co.'s type. Her ballast and feed pumps will be of the Warren type. Her hatch covers will be canvass treated with Preservo. Her construction is under the supervision of Nacey & Hynd, naval architects of Cleveland.

Capt. Thomas Deringer will bring the Munro out and Frank Trinkwater will be her chief engineer.

The steamer, Wm. A. Hawgood, building for the Atlas Steamship Co., Cleveland, was launched at the South Chicago yard of the American Ship Building Co. last Saturday. Miss Arlae Hawgood, daughter of Wm. A. Hawgood, christened the vessel. Quite a delegation from Cleveland attended the launching. The Hawgood is 552 ft. over all, 532 ft. keel, 56 ft. beam and 31 ft. deep. She will have thirty-two hatches, spaced 12 ft. centers. Her engines will be triple-expansion engine, with cylinders 23½, 38 and 63 in. diameters by 42-in. stroke, supplied with steam from Scotch boilers, 14 ft. 6 in. by 11 ft. 6 in., equipped with Ellis & Eaves draft and allowed 180 lbs. pressure. She will carry 10,000 tons. Capt. Wm. D. Ames of Cleveland will be master of the Wm. A. Hawgood and George Robbins will be chief engineer.

The steamer Adriatic was launched at the Lorain yard of the American Ship Building Co. on Saturday, and was christened by Miss Louise Latimer of Cleveland. The Adriatic is the fifth of the eight new steamers for the Lackawanna fleet to be launched at Lorain. The Adriatic is a duplicate of the steamer Cyprus which was lost on Lake Superior two weeks ago, and is therefore 440 ft. over all, 420 ft. keel, 52 ft. beam and 28 ft. deep. She has twenty-three hatches spaced 12 ft. centers. Her machinery will consist of triple-expansion engines, 22, 35 and 58 in. diameter by 42 in. stroke, and Scotch boilers, 13 ft. 9 in. by 11 ft. 6 in., equipped with Ellis & Eaves draft and allowed a working pressure of 180 lbs. Her carrying capacity will be 7,000 tons. She will be completed in about three weeks.

The freighter steamer H. P. Bope, building for the Standard Steamship Co., of which A. B. Wolvin, of Duluth, is manager, was launched from the West Superior yard of the American Ship Building Co. on Saturday last and was christened by Miss Laura E. Bope, of Pittsburg, daughter of H. P. Bope. The new steamer is 552 ft. over all, 532 ft. keel, 56 ft. beam and 30 ft. deep, having thirty-two hatches, spaced 12 ft. centers. Her engines are quadruple-expansion with cylinders 18½, 28½, 43½ and 66 in. diameters by 42 in. stroke supplied with steam from Babcock & Wilcox boilers.

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ATLANTIC COAST GOSSIP

Office of MARINE REVIEW,
1005 West Street Bldg.,
New York City.

The new Anchor Line steamship California, which sailed from Glasgow and Movile on October 12, arrived at her berth in New York on Monday morning. She had a full passenger list for her maiden trip, and is commanded by Capt. John Blaikie, formerly of the Furnessia.

The California is of 10,000 tons, and has accommodation for 300 saloon, 400 second cabin, and 800 third class passengers. She is divided into nine watertight compartments, has six decks, and is propelled by two sets of triple expansion engines. She averaged 17½ knots on her trial trips, but is built for an average speed of about 16 knots.

Goodman Phillips and James B. Lehneman appeared in the United States District Court at Boston, on the 18th, and retracted their former plea of not guilty and pleaded guilty of conspiracy in connection with the smuggling of Chinamen into Providence on the schooner yacht Frolic. By agreement between counsel sentence was deferred.

The Cunard liner Umbria arrived at New York on Sunday on her last trip, for an indefinite period, between Liverpool and New York. The Lucania will take her place in the service. On her last eastbound trip the Cunarder encountered heavy weather, and suffered no little damage. This westbound trip she again ran into a spell of rough seas lasting four days, her wireless apparatus being temporarily disabled through the breaking of a topmast.

A fire which started in the hold of the German steamer Gunther, lying at the Bush Terminal Stores in Brooklyn, did some $2,000 damage to ship and cargo before the blaze was extinguished.

The Gunther is owned by the Hamburg-American Line and is in the Brazilian service. She arrived at New York from Santos and Barbadoes on Oct. 11.

The all-water cable of the Commercial Cable Co. to Havena, has been spliced, and is now a complete connection between New York and Cuba. The New York shore end is at Coney Island.

The North German Lloyd will assume exclusive control on January 1 of the Mediterranean-Levant service, heretofore conducted in connection with the German Levant Line.

The British steamship Earl of Douglass, from Victoria, British Columbia, is bound for New York or Philadelphia with the largest cargo of lumber ever brought from the Pacific coast to the East. She left Coronel on Sept. 28.

The schooner Glad Tidings foundered off St. Andrew, Fla., while on her way from Baltimore to Ferdinanda with a cargo of coal, all of the crew being saved.

The Glad Tidings for many years was in the Baltimore-Brazil coffee fleet, and was then one of the best known square-rigged vessels afloat.

It is reported from Staten Island that a piece of land sold last Friday at Tottenville has been bought by the Southern Ship Building Co. of Jacksonville, Fla., to be used for a large ship building plant. The plot has a waterfront of 700 ft. on Staten Island Sound.

The Southern Ship Building Co. has a large plant at Jacksonville, and it is said to be the intention of the company to remove this plant, with considerable additions, to the Staten Island site.

Gold to the amount of $1,500,000 was engaged at the Assay office, New York, last Saturday, for shipment to Germany. It was taken by Muller, Schall & Co., and leaves per mail steamer this week.

The Verdi, a new steamer for the Lamport & Holt Line to South America, will make her maiden voyage from New York on Jan. 20. She will be an 11,000-ton steamer with an average speed of about fourteen or fifteen knots, and will have all the latest improvements to meet the requirements of the increased passenger trade to South America.

The men of the fire department in South Brooklyn, New York, are protesting against the habit of certain terminal companies keeping their docks and wharfs blocked with freight thereby hindering the approach of the engines with fire wagons. It is pointed out that during a recent fire aboardship the fireboat Seth Low fought the blaze for one hour before it was extinguished, the land companies having to stand idly by their apparatus as it was impossible to get it on the scene of action.

Arthur Daken, a Marconi operator employed at the South Wellfleet, Mass., station, was found dead in the operating room. Medical Examiner Curley believes that Daken, who was alone, received a charge of 35,000 volts of electricity while conducting experiments on his own account and in which he accidentally short-circuited the current.

Col. Robert M. Thompson, who has chartered the liner Mineola for a tour 'round the world, says the accounts circulated of his plans are greatly exaggerated. It is his intention to have a few personal friends with him, to travel by way of the Suez Canal, and to be gone about six months.

The steamer Sarnia, of the Atlas Line, arrived from Port Limon, Fortune Islands, and other ports on the Caribbean sea, with a broken high pressure piston. The accident happened when the vessel was leaving Cartagena on October 2, the voyage of 2,500 miles being accomplished on the remaining intermediate and low pressure cylinders.

General Manager Ballin of the Hamburg-American Line has stated that the company has no intention of attempting to regain the blue ribbon captured by the Lusitania. He declares that ships of the Lusitania type can only be constructed with government aid, and advocates his theory that teight or 10-day boats are the real dividend payers, besides supplying the maximum comfort.

On account of their fast time between Queenstown and New York, the two new Cunard liners will receive from the United States government from $4,000 to $6,000 for carrying United States mail destined to Europe each voyage. No contract to this effect is necessary, as the rate to be paid—35 cents per pound—is fixed by arrangement between the postal authorities of America and Europe.

Capt. Jensen, of the steamer Admiral Schley, reported the lack of activity of the Gulf stream and the temperature far below normal, on his arrival at Philadelphia from Port Antonio.

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BIDS FOR NAVAL SUPPLIES.

Bids received at the Bureau of Supplies and Accounts, Navy Department, for material and Supplies, opened Oct. 8, included the following:

Schedule 334.—Yards and Docks.

Class 36—Pensacola—Two Automatic Check Valves.

Bridgeman Bros. Co., 1426 Washington Ave., New York $190.00
Lunkenheimer Co., Cincinnati, O..... 220.00
Manhattan Supply Co., 127 Franklin St., New York 246.00
Berry & Aiken, 36th and Wharton Sts., Philadelphia, Pa. 298.00
Crane Co., 519 S. Canal St., Brooklyn, N. Y. 352.80
Excelsior Equipment Co., Frick Bldg., Pittsburg, Pa. 213.20
E. F. Keating Co., 452 Water St., New York 210.00
Manning, Maxwell & Moore, 85 Liberty St., New York 184.00
Vermilye & Power, 17 Battery Pl., New York 193.96
Central Metal & Supply Co., 609 E. Lobbard St., Baltimore, Md..... 200.00

Class 37—Pensacola—Check and Gate Valves.

Chapman Valve Mfg. Co., Indian Orchard, Mass. $43.56
Fairbanks Co., New Orleans, La..... 49.08
Lunkenheimer Co., Cincinnati, O..... 48.80
E. F. Keating Co., 452 Water St., New York 58.00

Schedule 348.—Navigation.

Class 76—Annapolis—Fifty Surveying Sextants.

Bausch-Lomb-Saegmuller Co., Rochester, N. Y. $4,500.00
Keuffel & Esser Co., Hoboken, N. J... 3,600.00

Class 77—Annapolis—50 Artificial Horizons.

Bausch-Lomb-Saegmuller Co., Rochester, N. Y. $1,500
Keuffel & Esser Co., Hoboken, N. J..... 1,100
Queen & Co., 807 Arch St., Philadelphia, Pa. 1,125

Class 78—Annapolis—Parallel Rules, Compass Reader, Barometers, etc.

Keuffel & Esser, Hoboken, N. J..... $56.66
J. B. Roache, 350 Fulton St., Brooklyn, N. Y. 69.00

Schedule 349—Ordnance.

Class 110—Washington—Brass Globe and Gate Valves.

Bridgeman Bros. Co., 1426 Washington Ave., New York $408.10
Chesapeake Supply Co., Washington, D. C. 518.71
Chapman Valve Mfg. Co., Indian Orchard, Mass. 175.08
Fairbanks Co., Baltimore, Md..... 259.74
Hartman Co., 1235 N. Front St., Philadelphia, Pa. 422.34
Manhattan Supply Co., 127 Franklin St., New York 259.21
William Powell Co., 2525 Spring Grove Ave., Cincinnati, O..... 663.44
Thomas Summerville Co., Washington, D. C. 505.91
Crane Co., 519 So. Canal St., Brooklyn, N. Y. 425.01
Cuyler & Mohler, 611 William St., Baltimore, Md. 407.08
E. F. Keating Co., 452 Water St., New York 262.80
Central Metal & Supply Co., 609 E. Lombard St., Baltimore, Md..... 543.24

Class 111—Washington—36 Brass Compression Bibbs and 48 Brass Cocks.

Chesapeake Supply Co., Washington, D. C. $60.90
Manhattan Supply Co., 127 Franklin St., N. Y. 51.96
Thomas Sommerville, Washington, D. C.. 53.76
A. B. Sands & Sons Co., 22 Vesey St., New York 61.44
Crane Co., 519 So. Canal St., Brooklyn, N. Y. 45.20
Cuyler & Mohler, 611 William St., Baltimore, Md. 74.04
E. F. Keating Co., 452 Water St., New York 58.44
Montgomery & Co., 105 Fulton St., New York 74.40
Central Metal & Supply Co., 609 E. Lombard St., Baltimore, Md..... 51.48

Class 112—Washington—Pipe Fittings.

Bridgeman Bros. Co., 1426 Washington Ave., New York $134.80
Chesapeake Supply Co., Washington, D. C. 203.12
Manhattan Supply Co., 127 Franklin St., New York 113.22
Thomas Sommerville Co., Washington, D. C. 143.46
Crane Co., 519 So. Canal St., Brooklyn, N. Y. 119.15
Cuyler & Mohler, 611 William St., Baltimore, Md. 134.42
E. F. Keating Co., 452 Water St., New York 138.86
Central Metal & Supply Co., 609 E. Lombard St., Baltimore, Md. 122.23

Schedule 350—Ordnance.

Class 125—Newport—600 Tripod Rods and Mooring Blocks.

Duplex Boiler Bushing Co., Belfast, Me. $1,182
Newport Engineering Co., Newport, R. I. 948
New Jersey Foundry & Machine Co., 9 Murray St., New York 396
Berry & Aiken, 36th & Wharton Sts., Philadelphia, Pa. 1,194
G. & W. Mfg. Co., 26 Cortlandt St., New York 840

Class 154—Norfolk—11,000 lbs. Condenser Tubes.

A. P. Swoyer Co., 17 N. 7th St., Philadelphia, Pa. $2,746.70
Benedict & Burnham Mfg. Co., 99 John St., New York 3,025.00
National Brass & Copper Tube Co., 41 Park Row, New York 2,746.70
Central Metal & Supply Co., 609 E. Lombard St., Baltimore, Md..... 2,970.00

WHARF AT GRAY'S HARBOR.

Abstract of proposals received by Maj. H. M. Chittenden, Corps of Engineers, United States Army, for constructing wharf and trestle at Gray's Harbor, Wash., received in response to advertisement dated Aug. 15, 1907. Opened Aug. 30, 1907.

Items	Quantities.	(1) International Contract Co. Seattle, Wash. Bid.	(1) Amount.	(2 Gray's Harbor Construction Co. Hoquiam, Wash. Bid.	(2) Amount.
Piles	57,000 lin. ft.	$ .19 6/10	$11,172.00	$ .17¼	$ 9,832.50
Lumber, rough	600,000 ft. B. M.	33.00	19,800.00	18.00	10,800.00
Lumber, dressed	120,000 ft. B. M.	35.00	4,200.00	18.50	2,220.00
Iron	8,000 lbs.	.06	480.00	.03½	280.00
Spikes	5,000 lbs.	.06	300.00	.03¼	162.50
Totals			$35,952.00		$23,295.00

JETTIES BROADKILL RIVER.

Abstract of proposals received in response to advertisement attached hereto, by Maj. C. A. F. Flagler, Corps of Engineers, U. S. Army, Wilmington, Del., opened Aug. 28, 1907, for jetty construction at new mouth of Broadkill river, Delaware.

No.	Name and Address of Bidders.	For construction of jetty. Section 1 at per linear ft. 230 ft.	Section 2 at per linear ft. 500 ft.	Section 3 at per linear ft. 650 ft.	Total.
*1	Latta & Terry Construction Co., Philadelphia, Pa.	$20.20	$ 8.00	$11.35	$16,023.50
2	Richard Parrott, Newburgh, N. Y.	22.00	10.50	11.00	17,460.00
3	Tatnall-Brown Co., Wilmington, Del.	25.75	9.75	12.35	18,825.00
4	Armstrong & Latta Co., Philadelphia, Pa.	100.54	20.96	35.39	56,607.70
5	Franklin K. Wills Co., Wilmington, Del.	24.50	9.50	10.20	17,015.00

*Accepted.

BIDS FOR LUMBER.

Abstract of bids received in response to advertisement dated Aug. 10, 1907, and opened by Major C. S. Riche, Corps of Engineers, at Rock Island, Ill., at 2 P. M., Sept. 10, 1907, for furnishing and delivering free on board cars 2,624,616 feet, B. M., fir lumber.

No.	Name and address of bidder.	Amount.
1	Allen & Nelson Mill Co., Seattle, Wash.	*$37,123.11
2	H. B. Waite Lumber Co., Minneapolis, Minn.	50,307.66
3	Lumber Manufacturers' Agency, Centralia, Wash.	46,234.68
4	Allen Sherman Lbr. Co., Littlerock, Wash. (for 1,262,371 ft.)	20,795.25
5	Union Lumber Co., Tacoma, Wash.	59,053.86
6	Great Western Lumber & Timber Co., Aberdeen, Wash.	42,335.05
7	Foster Lumber Co., Tacoma, Wash. (for 2,615,869 ft.)	51,308.39
8	Arthur Gamwell, Seattle, Wash.	52,497.01
9	Carstens & Earles, Inc., Seattle, Wash.	44,417.30
10	Tacoma Mill Co., Tacoma, Wash.	46,260.03
11	The Sound Lumber Co., Seattle, Wash.	48,555.40
12	C. M. McCoy, Minneapolis, Minn.	51,394.43
13	St. Paul & Tacoma Lumber Co., Tacoma, Wash.	62,990.78
14	Somerville Bros., Napavine, Wash.	54,367.13

*Recommended for acceptance.

BIDS FOR DREDGING AT NORFOLK, VA.

Bids received by Maj. J. E. Kuhn, Corps of Engineers, U. S. Army, Norfolk, Va., for dredging harbor at Norfolk, opened Sept. 4, were as follows:

Bidder.	Sec. A. 150,000 cu. yds. per cu. yd.	Sec. B. 1,800 cu. yds. per cu. yd.	Sec. C. 200,000 cu yds. per cu. yd.	Sec. D. 75,000 cu. yds. per cu. yd.	Aggregate of bids.
River & Harbor Improvement Co., Philadelphia, Pa.	.14	$1.50	.13 8/10	.25	$70,050
L. M. Lewis, Norfolk, Va.	.10 8/10	4.00	.11 1/2	.16 1/2	58,775
Coastwise Dredging Co., Norfolk, Va.	.10 7/10	4.00	.10 3/10	.18	57,350
Norfolk Dredging Co., Norfolk, Va.	.09 4/10	1.75	.10 4/10	.21 1/2	54,175

Sections A, C and D cover dredging; section B covers removing old bridge approach.

The steamers on the Mackinaw division of the Detroit & Cleveland Navigation Co. leave Toledo northbound on Mondays and Thursdays, and from Detroit on Mondays and Fridays; southbound they leave St. Ignace on Wednesdays and Saturdays and Mackinaw on Wednesdays and Saturdays also. The daily service beween Detroit and Cleveland will be continued until Dec. 1. The daily service between Detroit and Buffalo will be continued until Nov. 10

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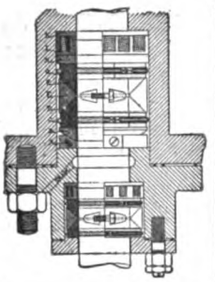

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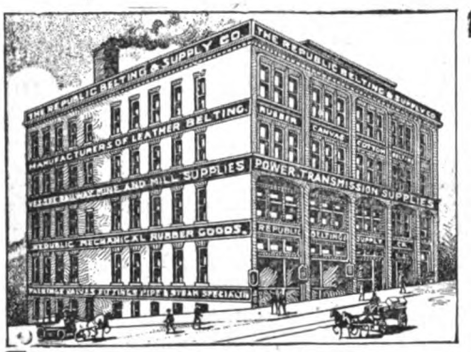

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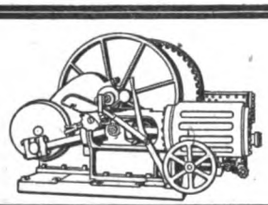
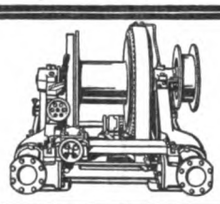
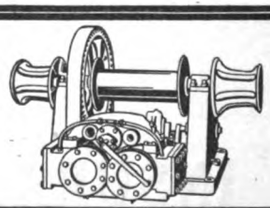

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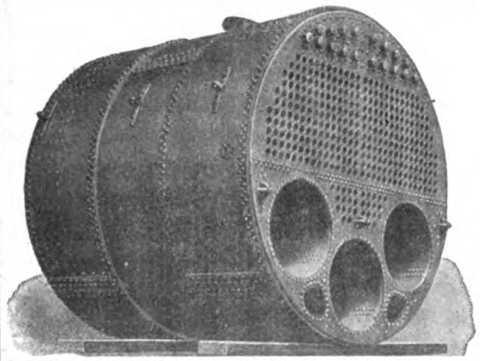

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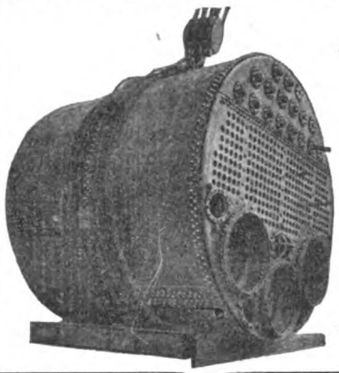

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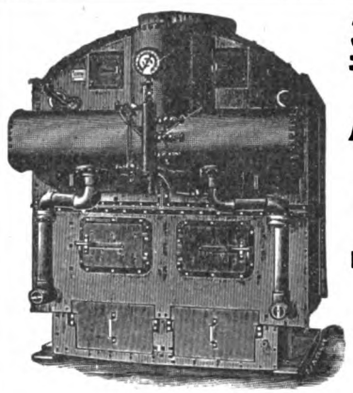

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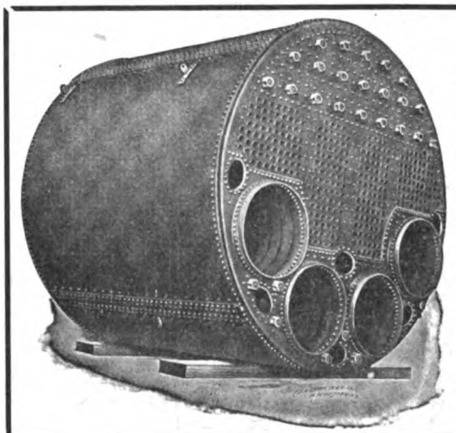

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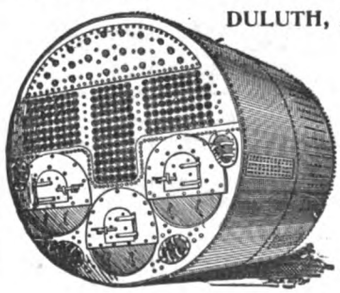

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PROPOSALS.

U. S. Engineer Office, Detroit, Mich., Oct. 8, 1907. Sealed proposals for rock and earth excavation at Section 3, Plan B, Detroit river, will be received at this office until 3 P. M., Nov. 20, 1907, and then publicly opened. Information furnished on application. Chas. E. L. B. Davis, Colonel, Engineers.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., Oct. 21, 1907. Sealed proposals for dredging at Muskegon Harbor, Mich., will be received here until 3 P. M., Nov. 20, 1907, and then publicly opened. Information furnished on application. M. B. Adams, Col. Engrs.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., Oct. 21, 1907. Sealed proposals for construction of breakwaters at Ludington, Mich., will be received here until 3 P. M., Nov. 20, 1907, and then publicly opened. Information furnished on application. M. B. Adams, Col. Engrs.

U. S. Engineer Office, Louisville, Ky., October 3, 1907. Sealed proposals for steel hull for snagboat will be received here until 12 noon, standard central time, November 4, 1907, and then publicly opened. Information furnished on application. H. Burgess, Capt. Engrs.

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A MARINE ENGINEER WANTED, who wishes to give us his work and devote his entire time to selling a boiler appliance to the marine trade, on either a salary or commission basis. Fine opportunity for a hustler, who is well acquainted with the trade. Hundreds of these machines are now in use on steamers plying the Great Lakes. Address Lanford, Montague, Mich.

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NEAFIE & LEVY F & A COMpound 26"-50" x 30" with Surface Condenser and Pumps. Will alter to 22"-50" x 30" for high steam.

13½ K. W. Electric Lighting Set.

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Two Hawser Pullers (Capstans).

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Worthington Duplex Air Pump & Jet Condenser 9" x 12" x 10".

D. C. Sturtevant Blower & Engine.

Two Scotch Boilers 12' x 12'.

Two Scotch Boilers 11' x 12'.

Two Scotch boilers 13½' x 12'.

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Specialty: "Working on the Failures of Others"
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Sawdolet (made of wood fiber, and mineral substances) can be applied to steel decks cheaply. It is fire proof, water proof, dust proof, and vermin proof. Can be colored any tint and is practically indestructible and monolithic. Samples submitted and estimates furnished.
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THE REMOVING OF DEEP WATER EARTH AND ROCK A SPECIALTY. - - -

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TA

Center, and Side Girder Keelsons, and Their Connecting Angles, in Connectio
and Stanchions

Length of Vessel Between Perp's	CENTER VERTICAL KEELSON PLATING AND CONNECTING ANGLES.				SIDE KEELSONS AND		
	Weight and Depth of Center Keelson	Longitudinal Double Angles Connecting Keel & Keelson Plating	Longitudinal Double Angles Connecting Keelson & Tank-top Plating	Vertical Angles Connecting Floors and Center Keelson Plating	Weight of side Keelsons and their Intercost'l Plating	Spacing and Number of Side Keelson	Longitudinal Angles Connecting Side Keelsons with Floors and Tank-top
Feet	ins. lbs.	ins. lbs.	ins. lbs.	ins. lbs.	lbs.	No. Ins.	ins. lbs.
1	2	3	4	5	6	7	8
180	48 x 15	4 x 3 x 9.8	3 x 3 x 7.2	3 x 3 x 6.1	11	6 S. K. 48	3 x 3 x 6.1
204	48 x 15	4 x 3 x 9.8	3 x 3 x 7.2	3 x 3 x 6.1	11	6 S. K. 48	3 x 3 x 6.1
228	48 x 15	4 x 3 x 9.8	3 x 3 x 7.2	3 x 3 x 6.1	11	6 S. K. 48	3 x 3 x 6.1
252	48 x 17½	4 x 3 x 10.1	3½ x 3 x 7.8	3 x 3 x 7.2	13	6 S. K. 50	3 x 3 x 6.6
276	48 x 17½	4 x 3 x 10.1	3½ x 3 x 7.8	3 x 3 x 7.2	13	6 S. K. 50	3 x 3 x 6.6
300	48 x 17½	5 x 4 x 12.8	3½ x 3 x 7.8	3 x 3 x 7.2	13	6 S. K. 56	3 x 3 x 7.2
324	48 x 17½	5 x 4 x 12.8	4 x 3 x 8.5	3 x 3 x 7.2	13	6 S. K. 56	3 x 3 x 7.2
348	54 x 19	5 x 4 x 12.8	4 x 3 x 8.5	3 x 3 x 7.2	15	6 S. K. 66	3 x 3 x 7.2
372	54 x 19	5 x 4 x 12.8	4 x 3 x 8.5	3 x 3 x 7.2	15	6 S. K. 66	3 x 3 x 7.2
396	54 x 19	5 x 4 x 14.5	4 x 3 x 8.5	3 x 3 x 7.2	15	6 S. K. 66	3 x 3 x 7.2
420	60 x 20	5 x 4 x 14.5	4 x 4 x 9.8	3½ x 3½ x 8.5	16	8 S. K. 62	3 x 3 x 7.2
444	60 x 20	5 x 4 x 14.5	4 x 4 x 9.8	3½ x 3½ x 8.5	16	8 S. K. 62	3 x 3 x 7.2
468	60 x 20	5 x 4 x 14.5	4 x 4 x 9.8	3½ x 3½ x 8.5	16	8 S. K. 62	3 x 3 x 7.2
492	60 x 22½	5 x 3½ x 15.2	4 x 4 x 9.8	3½ x 3½ x 8.5	16	8 S. K. 67	3 x 3 x 7.2
516	60 x 22½	5 x 3½ x 15.2	4 x 4 x 9.8	3½ x 3½ x 8.5	16	8 S. K. 67	3 x 3 x 7.2
540	60 x 22½	5 x 3½ x 15.2	4 x 4 x 9.8	4 x 3 x 9.8	16	8 S. K. 67	3 x 3 x 7.2
564	60 x 22½	5 x 3½ x 15.2	4 x 4 x 11.3	4 x 3 x 9.8	16	8 S. K. 69½	3 x 3 x 7.2
588	60 x 22½	5 x 4 x 16.2	4 x 4 x 11.3	4 x 3 x 9.8	17	8 S. K. 69½	3 x 3 x 7.2
612	72 x 24	5 x 4 x 18.1	4 x 4 x 11.3	4 x 3 x 9.8	17	8 S. K. 69½	3½ x 3½ x 8.5
636	72 x 24	5 x 4 x 18.1	4 x 4 x 11.3	4 x 3 x 9.8	17	8 S. K. 72	3½ x 3½ x 8.5
660	72 x 25	6 x 4 x 20	5 x 4 x 16.2	4 x 3 x 11.1	18	8 S. K. 72	3½ x 3½ x 8.5
684	72 x 25	6 x 4 x 20	5 x 4 x 16.2	4 x 3 x 11.1	18	10 S. K. 65	3½ x 3½ x 8.5
708	78 x 25	6 x 4 x 20	5 x 4 x 16.2	4 x 3 x 11.1	18	10 S. K. 65	3½ x 3½ x 8.5

*The outside or bilge girder keelsons should be fitted in line with the side tank plating and connected
†Plates of the weight of side keelsons must be fitted intercostal between floors to all side girder keelsons,

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...BLE F.

...n with Plate, Arch Girder, Spar Deck Beams, and Side Tanks, Where Hold Beams are Dispensed With.

...THEIR CONNECTING ANGLES.			TANK TOP STIFFENERS		TANK TOP PLATING.				
All Vertical Angle Stiffeners Connecting Keelsons with Channel Floors	Angle Lugs Connecting Floors and their Intercostal Plates	Angles Connecting Continuous Side Keelsons to Deep Floors	Tank Top Seam Straps	Transverse Stiffening Angles Between the Seam Straps Spaced 18 ins.	Plating within the Cargo Space or in way of Hatches	Plating in Engine Room: Tank Top	Plating in Engine Room: Engine Bed	Margin Plates Throughout the Tank Top	Plating Forward of Cargo Space
ins. lbs.	ins. lbs.	ins. lbs.	ins. lbs.	ins. lbs.	lbs.	lbs.	lbs.	ins. lbs.	lbs.
9*	10†	11	12	13	14	15	16	17	18
3½ x 3 x 6.6	4 x 3 x 7.1	3 x 3 x 6.1	9 x 16	3 x 3 x 6.1	16	15	17	42 x 14	14
3½ x 3 x 6.6	4 x 3 x 7.1	3 x 3 x 6.1	9 x 16	3 x 3 x 6.1	16	15	17	42 x 14	14
3½ x 3 x 6.6	4 x 3 x 7.1	3 x 3 x 6.1	9 x 17½	3 x 3 x 6.1	16	15	17	42 x 14	14
3½ x 3 x 6.6	4 x 3½ x 7.7	3 x 3 x 6.1	9 x 17½	3 x 3 x 6.1	17	16	17	50 x 15	15
3½ x 3 x 6.6	4 x 3½ x 7.7	3 x 3 x 6.1	9 x 17½	3 x 3 x 6.1	17	16	17	50 x 15	15
4 x 3 x 7.1	4 x 3 x 8.5	3 x 3 x 7.2	9 x 17½	3 x 3 x 7.2	17	16	17	50 x 15	15
4 x 3 x 7.1	4 x 3 x 8.5	3 x 3 x 7.2	9 x 19	3 x 3 x 7.2	18	17	18	60 x 16	16
4 x 3 x 7.1	4 x 3 x 8.5	3 x 3 x 7.2	9 x 19	3 x 3 x 7.2	18	17	18	60 x 16	16
4 x 3 x 7.1	4 x 3 x 8.5	3 x 3 x 7.2	9 x 19	3 x 3 x 7.2	18	17	18	60 x 16	16
4 x 3 x 7.1	4 x 3 x 8.5	3 x 3 x 7.2	9 x 20	3 x 3 x 7.2	20	18	20	60 x 16	18
4 x 3 x 8.5	5 x 3 x 9.8	3 x 3 x 7.2	9 x 20	4 x 3 x 8.5	20	18	20	70 x 18	18
4 x 3 x 8.5	5 x 3 x 9.8	3 x 3 x 7.2	9 x 20	4 x 3 x 8.5	20	18	20	70 x 18	18
4 x 3 x 8.5	5 x 3 x 9.8	3 x 3 x 7.2	9 x 20	4 x 3 x 8.5	20	18	20	70 x 18	18
4 x 3 x 8.5	5 x 3 x 9.8	3½ x 3½ x 8.5	9 x 20	4 x 3 x 8.5	20	18	20	80 x 18	18
4 x 3 x 8.5	5 x 3 x 9.8	3½ x 3½ x 8.5	9 x 20	4 x 3 x 8.5	20	18	20	80 x 18	18
5 x 3 x 9.8	6 x 3½ x 11.7	3½ x 3½ x 8.5	9 x 20	4 x 3 x 8.5	20	18	20	80 x 18	18
5 x 3 x 9.8	6 x 3½ x 11.7	3½ x 3½ x 8.5	9 x 20	4 x 3 x 8.5	20	18	20	80 x 18	18
5 x 3 x 9.8	6 x 3½ x 11.7	3½ x 3½ x 8.5	9 x 20	4 x 3 x 8.5	20	18	20	80 x 18	18
5 x 3 x 9.8	6 x 3½ x 11.7	3½ x 3½ x 8.5	9 x 20	4 x 3 x 8.5	22½	20	22½	90 x 20	20
5 x 3 x 9.8	6 x 3½ x 11.7	3½ x 3½ x 8.5	9 x 25	5 x 3 x 9.8	22½	20	22½	90 x 20	20
5 x 3½ x 10.2	6 x 3½ x 11.7	3½ x 3½ x 9.8	9 x 25	5 x 3 x 9.8	25	22½	25	90 x 22½	22½
5 x 3½ x 10.2	6 x 3½ x 11.7	3½ x 3½ x 9.8	9 x 25	5 x 3 x 9.8	25	22½	25	90 x 22½	22½
5 x 3½ x 10.2	6 x 3½ x 11.7	3½ x 3½ x 9.8	9 x 25	5 x 3 x 9.8	25	22½	25	90 x 22½	22½

...to tank top plating with angles given in the ninth column for vertical stiffeners.
...flanged to shell and lugged to keelson plates with angles given in column 10.